American Aviation

JULY 15, 1950 25c

THE AIR INDUSTRY'S PIONEER INDEPENDENT MAGAZINE

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Crisis in CAB

AT a time when the attention of the nation is focussed on Korea and its tremendous implications, the Civil Aeronautics Board is moving through a critical period of stress and strain. The government's regulatory agency for air transport is getting the most rugged test since it was created in 1938.

The sudden resignation of Chairman Joseph J. O'Connell, Jr., an able attorney who had no personal axes to grind, creates another serious problem for the Administration. Good men are difficult to find for jobs like this. On top of the personal financial sacrifice involved is the constant day-in-and-day-out pressures, political and otherwise, from both inside and outside of the Board. The chairmanship of the CAB is a thankless task.

Mr. O'Connell had made no secret of his desire to get out of the job. He wanted out last December. He remained at the President's urgent request. But somewhere in the picture, along with various other problems, is the embattled American Overseas Airlines—Pan American World Airways merger case.

No regulatory action in the twelve-year history of the CAB has been so bitterly controversial as this proposed acquisition by PAA of American's overseas company. The fact that officials on both sides of the case have described it as the "dirtiest" of all time is an indication in itself of the deep extent of the pressures, intrigues, maneuverings and the tuggings that have gone on for months. The stakes are high. Many government agencies are involved. So is the White House (both the staff and the President himself). The five members of the CAB have been caught in the political and industry whirl in various degrees of activity and impartiality.

At this writing there is no indication when the decision will finally see the light of day (it was within three hours of being issued on June 30), nor what the decision will be. The tragedy is that no matter what decision is finally issued, the stresses and strains of the government's regulatory agency will be difficult to straighten out. Some deep wounds will take a long time to heal. And it is difficult to see, now, that whatever decision on the merger is made, that the crystallization of American's international air policy in *the public interest* is any closer to achievement.

The CAB was created by Congress as a quasi-judicial independent agency to establish and promote and safeguard the public interest in common carrier

(*Turn to Page 8*)

Chief Engineer of American Airlines

M. G. (Dan) Beard, who has served American Airlines and predecessor companies for 23 years, has been named chief engineer of the airline. He had been director of flight engineering since 1943 and played an important part in development and testing of the DC-6. His work as an engineering and research pilot has long been outstanding.

In This Issue

- *When Will the United States Have Its First Atom-Powered Bomber?*
- *How Many Atom Bombs Will It Carry? How Far? How Fast?*
- *How Will It Operate?*

Read "The First Atom-Powered Bomber" on page 11 for speculative answers to these and other basic questions on this vital subject.

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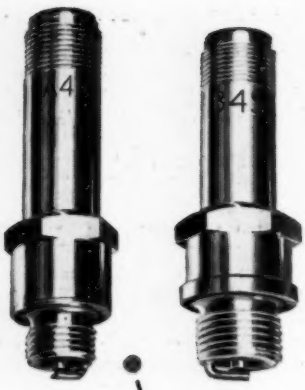

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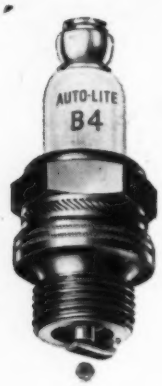

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High-Speed Refrigeration Turbine Wheel

This is a photomicrograph, at high magnification, of a fatigue crack which developed in a turbine wheel during laboratory overspeed test. Failure of vital components of jet airplanes traveling faster than the speed of sound cannot be tolerated.

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BACKGROUND & TRENDS

The Impact of Korea

Even with the Korean war in an early stage, airlines and manufacturers had already been affected, or would notice an effect soon. If the situation drags on, or becomes more critical, there will undoubtedly be far-reaching developments.

However, even now, on the airline side:

• Both scheduled and non-scheduled lines are flying a number of special charters from the U. S. to Japan for the Air Force. Northwest, Pan American, United, Transocean, Seaboard & Western, The Flying Tiger Line, and Overseas National Airlines are involved. There's been no disruption of scheduled service in the Pacific except, of course, Northwest's withdrawal from Seoul.

• Significantly, airlines asked CAB for permission, in tariffs, to remove ticketed passengers from flights when the military needs seats. Current heavy airline loads have created a problem in this respect.

• Future of the base at Shemya, in the Aleutians, was uncertain. At last report, however, the Air Force, scheduled to pull out of Shemya and other Aleutian bases on July 1, was still there. CAA's request for a $3.8 million appropriation to run the base (used by NWA and other airlines) after AF withdrawal, still hadn't been cleared by the Budget Bureau.

• With AF transportation officers busy on the Korean situation, domestic airlines had to postpone efforts to work out a new contract providing 10% discount for military passengers traveling on official business in fiscal 1951. The 1950 contract, with the same discount, continues for the time being.

On the manufacturing side:

• There may be more plane orders. President's original military budget ceiling has practically disappeared. A request for increased fiscal 1951 military aircraft procurement funds is a possibility, and would get a favorable Congressional reception. Indications are that the President will sign H. R. 1437, which would give Congress authorization on which to base increased appropriations up to the 70 group structure.

• Air Force and Navy may have to ask for supplemental 1950 money—operational funds. Both had considerable expense readying planes for overseas, an item not covered in the budget.

Transportation Taxes

Korean military situation may be deciding factor in **whether or not transportation taxes are reduced.** The House passed the tax bill cutting tax on transportation of persons from 15% to 10%, and on freight from 3% to 1½%. General feeling is that if war threat increases, Senate may discard tax-cutting idea.

New AF Planes Through MDAP

Aircraft manufacturers and the Air Force may benefit from the **$1.2 billion foreign arms aid** voted by the Senate. Lockheed F-80's and possibly Republic F-84's may be sent abroad under the Mutual Defense Assistance Pact. The planes would be taken from Air Force inventories and the AF would be reimbursed for their cost from MDAP appropriations. AF would then use the money to procure later aircraft types. Under the Senate bill (a companion bill is pending in the House), air forces of MDAP countries would get $309,533,133 for aviation equipment, of which half may be diverted to new procurement.

Jetliner Tour Canceled

Indication of the efforts being made by A. V. Roe Canada Ltd. **to speed certification of its Jetliner** is seen in cancellation of the plane's proposed European and British tour in August. Avro officials think they can advance Canadian and U. S. certification, airline demonstrations and service testing by three months by skipping the tour. Jetliner was to have flown at the Farnborough show of Sociey of British Aircraft Constructors in early September.

ATA Public Relations

Air Transport Association and airline officials are considering a **top-level industry public relations program** which would be affirmative and not defensive. ATA directors discussed it following resignation of John W. Thompson as the association's vice president-director of information. ATA public relations and governmental affairs will not be consolidated. A committee of airline officials will make recommendations on a program within 60 days. Whether it will be handled within ATA or by an outside public relations firm remains to be seen.

No Mail Pay Separation

There's little chance that legislation calling for **separation of air mail pay from so-called subsidies** will pass this session of Congress. Instead, it's probable that the Civil Aeronautics Board will be directed to make a study of the feasibility of separation. Transportation subcommittee of the House Interstate and Foreign Commerce Committee has okayed such a study. House and Senate must still approve.

Undesirable Word

Feederlines hope that CAB will **omit the word "temporary"** when it renews their certificates, and use "term" certificate instead. Reason: financing efforts are hampered when an authorization is described as temporary.

Target Date

Target date for inauguration of **Martin 2-0-2 service on TWA's domestic routes** is September 1. Company hopes to have all 12 of the planes, leased from Martin until delivery of 4-0-4's, in service a month later. At first they'll be used in the high-density traffic area east of Kansas City.

Feeder Flag-Stops

CAB has served warning that it will **go slow on approving flag-stops for feederlines** where the result might be a service pattern that would compete with trunklines. It refused to allow Turner Airlines to serve intermediate points on a demand, or flag-stop, basis on Chicago-Indianapolis, Indianapolis-Louisville and Indianapolis-Cincinnati segments, which are currently provided with one-stop service by the feeder. CAB's reason: the authorization "might result in non-stop service between major traffic points of such frequency as to adversely affect the certificated carriers providing trunkline service between such points."

Dutch Seek Transport Agreement

The Netherlands wants to talk again to the U. S. about a **bilateral air transport agreement.** Dutch requests have been considerably scaled down. Conferences following the war failed principally because of the scope of routes requested for KLM, including a line across the U. S. and on into the Pacific, resulting in a round-the-world route, plus operations to the south. Dutch are now reported primarily interested in Amsterdam-New York and Amsterdam-New York-Curacao, with traffic rights at New York. KLM is now flying the routes, but without New York traffic rights on the latter.

The Birdmen's Perch

No go too slow, too low!

Stalls are bad enough anytime, but at low altitudes they're poison. No matter how interested we get in the scenery, it's no fun to see it coming up at us so fast!

That's why we're so hepped up over a

new device we read about that's going to sell like hot cakes if pilots are the smart guys we think they are.

It's an automatic stall reminder—a horn that lets the pilot know when he's about to go into a stall. That's for us, Brother, and it should be for you!

Sorry we can't give you more info at the moment, but suggest you make some inquiries yourself. It's our bet that this little gadget is going to prevent the ruination of lots of nifty little ships and plenty of pilots.

In our book, it's an A Number 1 necessity!

MAKE WITH THE COMMERCIAL, FERDIE!

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Great Scott, Man, get some! Increase those periods between overhauls up to 100%!

LITTLE KNOWN FACTS DEPT.

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Well, you will from now on because Don has just earned great distinction and a shiny new Commission of Perch Pilot (bottom rung, of course) for submitting, with PROOF, a Little Known Fact that may account for the paper shortage! To wit:

Blueprints required for a big Air Force bomber would cover 125 football fields!

Fine, Don, absolutely fine! It's facts like these that restore our faith in football. Now—be a good fellow and tell the other boys and girls how much fun it is to be famous.

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NEWS IN BRIEF

AOA-PAA Merger: At press time there was still no indication when the long-awaited decision by the CAB on the proposed acquisition of American Overseas Airlines by Pan American World Airways would be issued. Nor was there any indication of the final result.

The CAB was within three hours of announcing the decision on June 30 when the scheduled press conference was suddenly cancelled. At that time the CAB vote was reliably reported as 3 to 2 against the merger and President Truman had put his signature to a formal letter confirming the Board action. On July 3 the White House letter was withdrawn and the situation became very confused. It was reliably reported that Defense Secretary Louis Johnson had taken a renewed interest in the case. On July 8 came the resignation of Chairman O'Connell.

As of noon July 10 neither PAA nor American had filed extensions of the purchase agreement which was to expire by midnight on that date. On June 6 the agreement had been extended to June 30, then extended on that date to July 10. Status of the legal aspects of the agreement was as uncertain as the CAB decision itself.

O'Connell Resigns: President Truman accepted on July 8 the resignation of Joseph J. O'Connell, Jr., as chairman of the Civil Aeronautics Board. It was effective immediately. O'Connell took office April 6, 1948, succeeding James M. Landis. O'Connell had wanted to give up his post last December but stayed at the President's request. He submitted his resignation June 13. Although he has wanted to return to his private law practice, Washington sources were quick to tie his resignation and the "immediate acceptance" by the President to the highly-controversial AOA-PAA merger case. Vice Chairman Oswald Ryan becomes acting CAB chairman. The chairmanship post pays $15,000 per year.

Rentzel May Move: Under consideration in Washington is a reorganization plan by which CAA Administrator Delos Rentzel would be named Assistant Secretary of Commerce for Air, replacing Thomas W. S. Davis who would then become Under-Secretary of Commerce to fill an existing vacancy. Under the proposal Rentzel would be given greatly expanded duties.

More Atlantic Service: The U. S. and Spain have amended their bilateral air agreement to provide two Atlantic routes for the Spanish: (1) Spain to San Juan, Puerto Rico, via Lisbon, Azores, Bermuda and Caracas, and (2) Spain via Lisbon, Azores and Bermuda to Miami, and beyond Miami (a) to Mexico and (b) to Havana and points beyond in the Caribbean and the west coast of South America. Original agreement, signed in late 1944, included routes for U. S. but left those for Spain to later negotiation.

Slick Asks RFC Loan: Slick Airways has applied to Reconstruction Finance Corp. for a $1 million loan to be used as working capital. RFC is studying the request, and the loan must also be approved by CAB.

Convairs for Ethiopia: Ethiopian Airlines has been authorized a credit up to $1 million by the Export-Import Bank to assist in purchase of two Convair-Liners and spares from Airfleets Inc., Consolidated Vultee subsidiary. Purchase price, with a large spare order, will be about $1.7 million. The $1 million is part of a $3 million credit authorization made to the Ethiopian government in 1946. The airline will pay 25% cash, and the balance will be paid in eight semi-annual installments starting June 30, 1951. Convair will carry 25% of the financed portion of the purchase price while the Export-Import Bank will carry the remainder.

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EDITORIAL

(CONTINUED FROM PAGE 1)

air transportation. Basically, the law is sound. The five members have the facilities at their command to act honestly and independently. On international cases, however, the President is empowered by law to approve or disapprove of the Board's actions. The record of the CAB to date has been a willingness all too often to submit to pressures on both domestic and international cases, so much so, in fact, that the Board's existence as a quasi-judicial body is threatened. Added to outside pressures are the intrigues and ax-grinding within. The longer one remains on the Board the more potent he can become in influencing decisions through the staff level.

We are not so much concerned with the decision in the AOA-PAA merger case as we are with the disintegration of the CAB through the tugging and pushing and the straining to the extreme limit of the *public interest* regulatory procedures which were to lead to impartial and honest opinions. Industry, of course, must bear a very great part of the blame for whatever abuses and pressures have been exerted. The tragedy is that the alternative to a quasi-judicial body is most likely to be much worse than what we have had in the past. Government controls are all too often the inevitable result of abuses of less-constricted procedures.

The crisis in the CAB, of which the AOA-PAA merger case is but a climactic symptom rather than the sole cause, is a real one for U. S. air transportation.

Police for IATA

THE airlines of the world who are members of the International Air Transport Association are now considering for final action the setting up of their own police system, an inspector-general and staff who would follow up complaints by members against other members and have the authority to recommend action against violators of IATA rules. The idea has been approved in principle by the IATA executive committee.

It's about time that IATA members took steps to put teeth in their own traffic, tariff and cargo rules. No matter where one travels in airline circles these days, one hears nothing but complaints by one carrier against another. This is especially true in South America and in Europe. The accusations being made by one member against another are sufficiently serious that something must be done either to disprove the accusations or to punish the violators, else IATA will disintegrate and eventually the matter of setting and enforcing standards will fall to governments.

Self-policing is a sensible solution if each member will abide by disciplinary action. Probably many of the accusations now being made loosely by one carrier against another are groundless, but at the same time there are probably a substantial number of violations. IATA is being tested today on the all-important question of whether it is willing to back up with enforcement the fine-sounding words, ethics and codes which it has adopted. If it isn't, IATA may well be diluted into a back-patting membership organization of all front and no depth.

Some of the world's airlines are finding it difficult to accustom themselves to the greatly-expanded and highly-competitive international scene. But the right to operate beyond one's own borders involves competition. Competition involves giving as well as taking. Some airlines find it very easy to take but extremely painful to give. In the final analysis, however, they cannot expect to take more away from home than they are willing to give at home.

Let's hope that IATA settles its own problems within its own organization. It may be a temptation for some carriers to seek the backing of their governments in restrictive traffic or tariff matters, but government involvement in such details leads only to more government machinery. Self-policing is certainly more desirable than government policing. Let IATA set up its inspection procedures, follow up every complaint, exercise discipline when necessary, and then let the loose talk now prevailing on every continent cease for good.

WAYNE W. PARRISH.

News in Brief

Big Cessna Contracts: As a result of winning the Army Field Forces' liaison plane competition, Cessna Aircraft Co. has been awarded a contract for 400 planes, spare parts and equipment totaling about $5 million. The plane is the two-seat tandem L-19A, an all metal high-wing monoplane powered by a Continental 213-hp E-190. It was one of the largest military contracts ever awarded for light planes. A few days later, Cessna received a $170,000 Air Force contract for LC-126 liaison planes for use in search and rescue operations. Last year the AF bought 12 of the planes (military version of the Cessna 190) for $400,000, including spares. New order is believed to cover about six.

Lightplane Decline Continues: Shipments of one to 10-place personal and executive aircraft totaled 1,380 in the first five months of 1950, against 1,657 in the same 1949 period, a drop of 277. Total for May, latest month available, was 359, of which 241 were four-place or more, and 118 one and two-place. Same month last year showed 457, including 305 four-place or over and 152 one and two-place.

Orders Two Constellations: Aerovias Nacionales de Colombia (Avianca) has ordered two L-749A Constellations from Lockheed Aircraft Corp. and has an option to buy a third. The planes and spares will cost $2.6 million. They will be used Bogota-New York and Bogota-Europe, replacing DC-4's.

Stratofreighters for MATS: Military Air Transport Service's Atlantic Division has received the first of three new Boeing C-97A Stratofreighters, and has formed the 1255th Air Transport Squadron to handle them. The planes are now engaged in training flights preparatory to going into service between Westover, Mass., Europe and the Middle East.

(PHOTOGRAPH COURTESY OF PAN AMERICAN-GRACE AIRWAYS)

A Good Sign to Fly to...

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Limatambo Airport handles the large volume of air traffic to and from Lima, Peru. Here as around the world, aircraft owners and operators depend on Esso Aviation Products – products that are constantly being improved by research and development to keep pace with and even anticipate the changing requirements of modern aviation. The Esso winged oval symbolizes petroleum products of uniform, controlled quality backed by more than 40 years of aviation experience.

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B.F.Goodrich

It's rough on subs, smooth on runways

ARMED with electronic search equipment, plus torpedoes, rockets, cannon and machine guns, the Navy's Lockheed Neptune is designed to hunt down the formerly radar-proof "snorkel" submarines. With all this equipment to carry, engineers had the problem of shaving every possible pound off the plane design. When it came to the wheel and brake assembly, they turned to B. F. Goodrich.

B. F. Goodrich Expander Tube Brakes can be designed lighter for a given amount of kinetic energy than any other brake. The new spider-type frame is both lighter and stronger. The brake lining is mounted on magnesium shoes—a type of construction that is lighter, yet gives longer wear. And the wheels themselves are light, strong magnesium castings.

As a result, the B. F. Goodrich assembly on the Lockheed P2V-4 saves considerable weight over other designs. *And* it provides smoother, safer take-offs and landings. BFG brakes cannot lock or grab. They respond smoothly and quickly to minimum pressure. They take emergency overloads better.

BFG brakes also increase plane availability. There's less in-shop time for replacement and repair. Relining jobs can be handled with a screwdriver and wrench. Wear on all parts is slower because the load is evenly distributed.

The main wheels and nosewheel on the Neptune are equipped with B. F. Goodrich tires and tubes for maximum safety and economy. This complete B. F. Goodrich wheel assembly is one of many effective solutions to aviation problems perfected by B. F. Goodrich research. *The B. F. Goodrich Co., Aeronautical Div., Akron, Ohio.*

B.F.Goodrich
FIRST IN RUBBER

ESTABLISHED JUNE 1, 1937 VOLUME 14 NUMBER 4 American Aviation

THE FIRST ATOM POWERED BOMBER...

when will we have it?

what will it do?

how will it work?

THERE have been, at various times, reports in the press as to the potentialities of a nuclear energy-powered aircraft, with references in vague terms to the tremendous range and high speeds such power will make available.

But few people outside the Air Force's Nuclear Energy for the Propulsion of Aircraft (NEPA) project have more than a superficial knowledge of the specific performance which nuclear energy will make possible, or of the manner in which this energy is converted to aircraft use.

To give its readers a better grasp of this increasingly significant subject, AMERICAN AVIATION has undertaken to design a hypothetical nuclear-propelled plane, which we shall call Nepa One, and to compile its performance data. The information upon which the design is based has been assembled from a number of unclassified sources. The resultant design is, of course, opinionative; but it represents a fair estimate of what can be expected from nuclear energy.

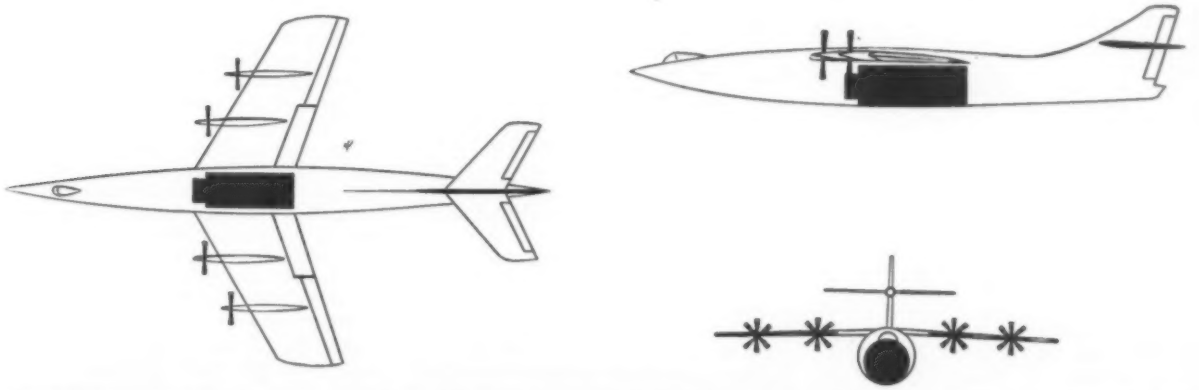
The airplane to be described here might be termed an interim atom plane. By that is meant that it is the earliest model that can be expected. Its performance is limited by such things as the types of heat-transfer metals which will be available by the estimated flight date and the type of power plant which was selected because it is known to be in development today and will apparently be the first nuclear type available.

Basic Questions

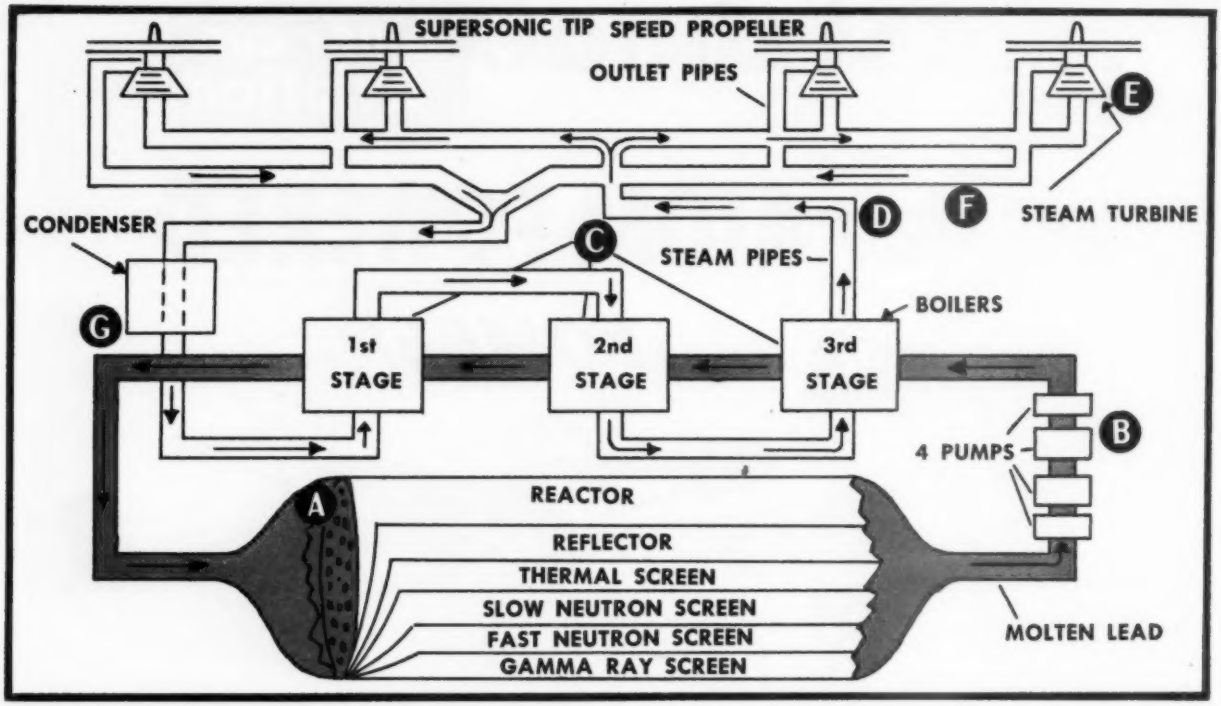
There are three basic questions which might be asked about this hypothetical airplane: When will we have it? What will it do? How does it work?

• **When will we have it?** The prototype of this airplane could be ready for flight testing by 1960. This date is based chiefly upon an estimate of power plant availability. The power plant selected is a closed-cycle steam driven turbo-prop engine, similar to a nuclear energy power plant already under development for the Navy for submarine use.

The use of propellers in an atom-powered plane might seem strange. However, the use of the steam turbine power plant dictates the need for a propeller. In a closed-cycle system, the steam which is used to turn the turbine may be returned to its source, condensed into water and used again. (If the steam were forced out the rear of the turbine on the jet thrust principle, it would be necessary to carry an impossible amount of water to provide fresh steam.)



ARTIST'S CONCEPTION of Nepa One, a theoretical 1960 atom powered bomber. The darkened area shows the comparative size and location of the nuclear reactor.



Nuclear Power Plant— This is a schematic drawing of the type of nuclear power plant proposed for Nepa One. (A) is the reactor with its five layers of radiation shielding. Through 7,280 tubes in the reactor passes molten lead, which is heated to extreme temperatures. The lead then passes through a series of pumps, (B), through a three-stage boiler system, (C), then back to (A) to repeat the cycle. Water, starting at (G), runs through each of the three boiler stages, where the molten lead converts it to very hot, high velocity steam. The steam is then ducted through pipes, (D), to drive the four turbines, one of which is illustrated by E. After spinning the turbines, the steam is piped back through other ducts, such as (F), to a condenser, (G), which reconverts it to water. The cycle is then repeated.

It has also been determined that propellers will be ready by estimated flight date which can absorb the power of the steam-driven turbine, in this case 14,000 horsepower per engine. Propellers of 12 feet diameter are now under development which, it is believed, will attain helical tip speeds of Mach 1.3, or 130% the speed of sound, and which can absorb up to 15,000 horsepower at about 50% efficiency.

• **What will it do?** Performance estimates for this particular design include a cruising speed of 800 miles per hour (Mach 1.2) and a range of 58,000 miles. These figures assume the use of one kilogram of fissionable material.

Specific fuel consumption of fissionable material would be 1/7000 of a gram per horsepower per hour.

Cruising altitude would range from 30,000 to 50,000 feet, and ceiling would be 57,000 feet. Nepa One would stall at 135 miles per hour.

• **How does it work?** The application of nuclear energy to aircraft propulsion seems like a formidable project, and it is, from the standpoint of the engineering to be accomplished; but in principle it is relatively simple. To best describe Nepa One's power plant, we should start with the focal point the reactor.

The word "reactor" has become a familiar one in the past few years, but few people can explain its use. In simplest terms, the reactor is a source of heat; in Nepa One it provides the heat which converts ordinary water to high velocity steam which pours through wing ducts to drive the turbines. Here is a basic description of Nepa One's reactor system:

How Reactor Works

Imagine a cylinder 15 feet long and five feet in diameter. Now insert in the cylinder 7,280 small tubes, running the length of the cylinder, so that you get a honeycomb effect. The reason for the large number of tubes is to attain an acceptable heat transfer rate; the greater the area exposed, the more efficient the heat transfer. In between each of the tubes is the nuclear heat source, a mixture of solid enriched uranium and aluminum oxide.

Through the 7,280 tubes a working fluid is forced by means of four pumps; the working fluid in Nepa One is molten lead, although others may be used. The heat source (the uranium-aluminum oxide core) heats the lead to at least 700 degrees Centigrade, because the lead would harden at lower temperatures, yet not over 1,500 degrees Centigrade, the maximum the stainless steel tubes could stand. The white-hot lead then passes out of the reactor and through a series of three water boilers where it converts the water to high-velocity steam. Having accomplished this, the lead is ducted back to the reactor to repeat the cycle.

The triple boiler system provides for three successive expansions to equalize steam and water distribution. Heat from the lead is passed to water entering the first stage boiler at 20 degrees Centigrade and a velocity of eight feet per second; by the time the water has been processed through the three stages, it has attained a temperature of 550 degrees Centigrade, a velocity of 90 feet per second and a pressure of about 600 lbs./sq. in.

The high velocity steam is then piped through wing ducts to the four engines, where it is used to spin the turbines. Having served this purpose, it is then led back to the boilers for re-use; thus the term closed-cycle. On its way back to the boilers, the hot steam passes through a condenser, which reconverts it to water.

Next comes the question of shielding. The fact that shielding of the reactor is required to protect the crew from radiation is well known. In the case of Nepa One there would

be five separate layers of shielding. First, nearest the reactor, comes a reflector, made of beryllium oxide; the reflector, as its name might indicate, serves as a shield to bounce escaping neutrons back into the reactor. To protect the crew and the plane from the intense heat generated by the reactor, a heat shield is required. In Nepa One, a layer of sodium outside the reactor serves to contain the heat.

Next come the radiation shields, three of them in this case. Radiation is emitted in three forms—from (1) escaping slow neutrons, (2) fast neutrons and (3) gamma rays. Each requires a different shield material. Nearest the reactor and the layer after the sodium layer, is the slow neutron shield, a wall of cadmium, a moderately heavy metal. Next comes the fast neutron shielding layer, made of paraffin wax. Finally, the gamma shield, a heavy iron wall encasing the entire reactor and shielding assembly. In addition, the molten lead passing through the reactor acts as an auxiliary shield, permitting some weight saving.

New Crew Member

To get complete radiation protection, the screening weight would be prohibitive. Therefore, Nepa One will have only partial protection; some portions of the reactor screen will be thinner than others, the heaviest shielding being provided for the sides directed at the crew: the ends and perhaps the top. This will result in some radiation leakage and will entail the services of a new crew member, whom we shall call the Geigerman.

It has been determined that the human system can absorb a small amount of radiation (.1 roentgen over an eight-hour period) without harm. It will be the Geigerman's duty, then, to keep a careful check on the amount of leakage and keep it within safe limits. He may control the leakage either by a system of adjusting the shielding or by regulating the power output of the reactor.

In Nepa One the pilot will not be able to start the reactor by a simple flick of a switch. For this purpose the Geigerman will be employed. Inserted between the lead-carrying tubes in the reactor will be a number of cadmium control rods, connected to a master control switch. As long as the cadmium rods remain in the reactor, no reaction can take place, because cadmium attracts the neutrons. Once the rods are withdrawn, however, the neutrons can initiate fission by smashing against the uranium atoms in the heat generating chain reaction. Thus to start the reactor the Geigerman has simply to withdraw the cadmium control rods; to shut down power he re-inserts them.

It is obvious that it will not be practical to use a throttle for the reactor; thus speed must be regulated by propeller controls. The turbine and the propeller will rotate at a constant speed, so the plane's velocity must be regulated by changing propeller pitch, a system already in use for modern prop-jet aircraft. The single-rotating eight-bladed supersonic propellers would probably be made of solid titanium, toward which there is already a trend in propeller design.

So much for the general system. What kind of airplane is Nepa One? Obviously its prime value as a weapon is as a bomber. But where previously bombers were built around the bomb bay, Nepa One must be built around the reactor.

Weight Analysis

Here is a breakdown of the weights involved in Nepa One's power plant:

the reactor itself, including the weight of the solid uranium and aluminum oxide, and the weight of the 7,280 stainless steel reactor tubes, 27,000 pounds;

the cadmium control rods, 2,000 pounds;

the circulatory system, or the molten lead, 28,000 pounds (includes pumps);

water for steam generating, 2,000 pounds;

the three stainless steel boilers, 18,000 pounds;

the steam ducts, 4,000 pounds;

the turbines (cobalt steel buckets) and propellers and controls, 9,000 pounds.

Total so far, 90,000 pounds.

But there is still the big matter of shielding. Here's how that breaks down:

the beryllium reflector, the first layer, 4,000 pounds;

the heat shield, or thermal barrier, layer No. 2, 3,000 pounds;

the three radiation screens, one each of cadmium, paraffin wax and iron, 110,000 pounds.

Grand total for the power system and shielding, 207,000 pounds.

Obviously this is going to make Nepa One a big airplane, although it must be remembered that no fuel weight is involved.

The design best suited to utilize the potentialities of the steam turbine system is a four-engine swept-wing bomber powered by four steam turbines developing a total of 56,000 horsepower, each driving an eight-bladed titanium propeller with a blade thickness-chord ratio of 2%. The wings are swept at a 35-degree angle, while the tailplane has a 40 degree sweep. The plane is 205 feet long but the span is only 105 feet; fuselage diameter is 16.4 feet.

Three Atom Bombs

Nepa One can carry three atomic bombs, located side-by-side below the reactor. Surprisingly, they weigh only 1,000 pounds each. Although the weight of an atomic bomb has been estimated at 7,000-10,000 pounds, the bulk of this is in shielding, a lead casing around the bomb core. Embedding the bombs beneath the reactor permits taking advantage of the heavy shielding around the reactor to also provide radiation protection from the bomb core itself. Thus the lead casing can be eliminated.

For ground handling purposes, a portable radiation screen must be devised to protect armament men while loading the bombs; once loaded, the screen may be removed.

The equipped structure weight is

NEPA One

(American Aviation's engineering staff's conception of the first atom-powered airplane)

Performance

Speed (max. and cruising)	800 mph true air speed (Mach 1.215)
Range (1 kg. fissionable material)	58,000 statute miles
Cruising altitude	30,000-50,000 feet
Ceiling	57,000 feet
Specific fuel consumption	1/7,000th gram/hp./hr.
Stalling speed	135 mph

Design

Wing span (35° sweep at 25% chord)	105 feet
Length	205 feet
Height	46 feet
Fuselage diameter	16.4 feet
Wing area	2,600 sq. ft.
Wing loading	125 lb./sq. ft.
Power plant	4 steam-driven turbines developing 14,000 hp each
Power loading	5.8 lb./hp
Propellers	4 8-bladed, single-rotating, titanium

Weights

Gross take-off weight	327,000 lbs.
Max. landing weight	321,000 lbs. (98% of gross t. o. weight)
Basic power plant weight	90,000 lbs.
Weight of radiation shielding	117,000 lbs.
Bomb load	three 1,000-lb. atomic bomb cores

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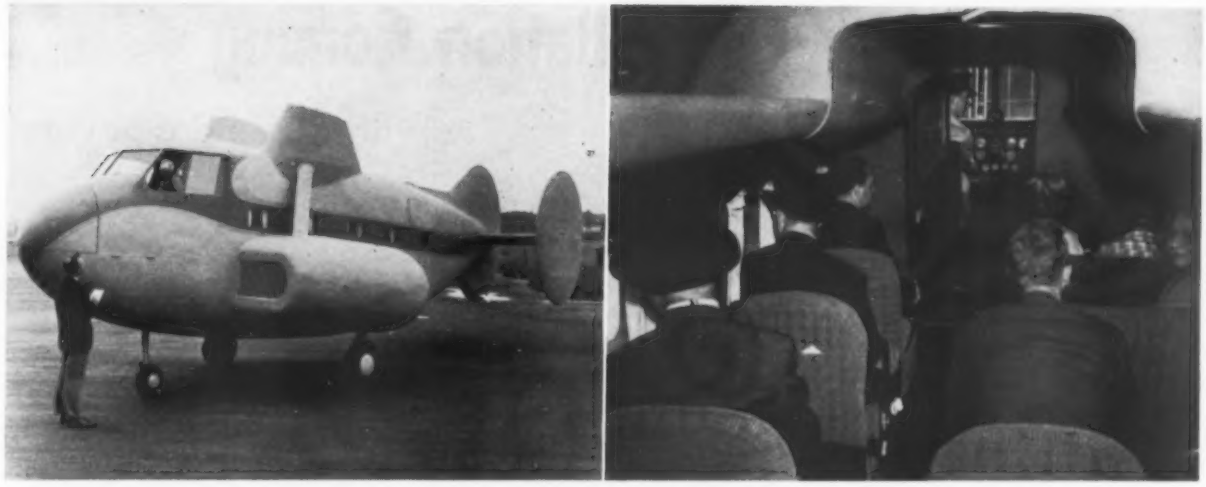

Passenger Helicopter—This is the latest bid for potential transport helicopter business, the Kellett KH-2A. Kellett Aircraft Corp. has completed a fully engineered mock-up of the plane, which is a commercial version of the Air Force's XH-10 helicopter. The mock-up (left) does not show the rotor installation but the plane would have twin intermeshing rotors mounted on the two hubs atop the fuselage. Seating arrangements are available for 12 to 16-passenger versions. Power is supplied by two Wright C7B6 engines of 800 horsepower each mounted externally, with external shafts connecting to the rotor hubs. Performance estimates, based on flight tests with the XH-10, include a 90 mph cruising speed with full load, top speed of 115 mph, a 1,400-foot rate of climb and a hovering ceiling of 13,300 feet. The external mounting of the engines permits greater cabin size; the cabin (right) is 15 feet long, five and one half feet wide and six and one half in height. Overall length of the plane is about 32 feet; rotor diameter is 65 feet.

101,000 pounds, and radio, radar and component equipment will add another 10,000 pounds. The weight of the armament is estimated at 5,000 pounds. With a 4,000-pound allowance for crew and personal equipment (a six-man crew duplicated for long missions), the gross take-off weight is brought to 327,000 pounds. Maximum landing weight is 321,000 pounds, about 98% of the take-off weight, since there is little disposable load (only the bombs and expended ammunition).

Tactical Advantages

The tactical advantages of Nepa One should be apparent. With its tremendous range, unlimited for practical usage, it needs only one air base, possibly Edward's AFB in California's Mojave Desert. With its high cruising speed any target in the world is only a few hours away; its speed also makes it a difficult target even for what we can expect in the way of guided missiles by 1960. With its three bombs it could strike three widely separated targets on a single mission, approaching each by circuitous routes. One can readily imagine the destruction which, say, a dozen such aircraft, would be capable of inflicting.

The study presented here presents only one likely application of nuclear energy to aircraft propulsion. It will also be possible to apply the reactor principle to turbo-jet, ram-jet, rocket or other types of engines.

Also, the materials mentioned are not inflexible. For instance, sodium, bismuth or mercury might be used as the working fluid in the reactor instead of molten lead; concrete or lead might be used in radiation shielding; beryllium or tungsten might be used instead of aluminum oxide as the alloying element in the reactor. In addition, the processes mentioned here might become outdated by future discoveries before actual construction on an atom-plane is started.

However, it is felt that, in the light of the available knowledge today, Nepa One represents a good estimate of the processes involved in adopting nuclear energy to aircraft propulsion.

Finally, it might be well to add that while it is comparatively simple to put this design on paper, there are innumerable design and engineering problems to be solved before the nuclear energy-powered airplane may fly: development of new heat transfer materials, research into the screening problem, lessening the size of the reactor, development of an undercarriage which can absorb the high landing load, stressing the airframe to take the concentrated 100-ton load imposed by the reactor system (about double the stress in the B-36 bomb bay), and the general engineering of the detailed components. All of them are difficult, but none appears insurmountable.

There seems to be little question that, in the not-too-very-distant future, a plane of Nepa One's general capabilities or of even greater performance will be able to take to the air.

PEOPLE IN THE NEWS

Dr. Edward Warner has been re-elected for a three-year term as president of the Council of the International Civil Aviation Organization. He served as president of the Interim Council of the Provisional International Civil Aviation Organization from 1945 to 1947, when he was elected president of the first Council of ICAO.

John C. Leslie, vice president-administration of Pan American World Airways, is in Columbia Presbyterian Hospital, New York City, being treated for paralysis resulting from an attack of polio. The effect of the paralysis will not be known for several weeks.

Peter Redpath was reported to be resigning as executive vice president of the Scandinavian Airlines System in order to become sales manager for Canadair Ltd., Montreal. **K. H. Larsen**, who has been technical representative for SAS in this country, will become Redpath's assistant in the new position.

Dr. Eric Walker will become executive secretary of the Research and Development Board, Department of Defense, August 1, on leave from Pennsylvania State College. He will succeed **Dr. Robert F. Rinehart**, who is returing to Case Institute of Technology.

Capt. Granville Conway has resigned as director of the Transportation Office of the National Security Resources Board but will continue to serve the board in an advisory capacity.

Super Constellation Coming

. . . with 40% more payload

It's Super—This is the way Lockheed's new L-1049 Constellation, with 18.4 feet added to the length of the fuselage, will look in flight. Wing and tail areas remain the same, but one other change in outward appearance will be square-type windows. Eastern Air Lines has ordered 10 of the new 116,000-lb. Constellations which Capt. Eddie Rickenbacker first called "Super." Lockheed decided that's a good name and will so call it officially.

By FRED HUNTER

LOCKHEED Aircraft Corp. is incorporating a number of improved features in the L-1049 Constellation, which will make its first appearance over the routes of Eastern Air Lines in the fall or early winter of 1951.

EAL has ordered 10 of the new-type, larger Constellations at a cost, including engines and spares, reported at approximately $18,000,000. The schedule calls for delivery of the first production airplane in July of next year.

The Lockheed company has as yet made no public announcement of its program under which it will continue the Constellation line with three improved models, but the L-1049 will be keyed to spearhead the group and Lockheed has decided to term it the "Super Constellation."

The other two models coming up are the L-749A, adding jet exhaust stacks to the present plane for better performance, and the L-749B, which will have higher gross weight, greater speed and range and structural strengthening for possible conversion to turbine-propeller power.

KLM is now making airline service tests of the jet exhaust stacks for Lockheed and they should be approved for L-749A application shortly. The L-749B will not be placed into production until after the L-1049 and therefore will not be available until sometime in 1952.

Longer Fuselage

Outstanding distinguishing feature of the L-1049 Super Constellation will be its elongated fuselage, which will be stretched out a solid 18.4 feet, thus allowing for a high degree of flexibility in space-weight utilization.

The L-1049 will retain the same wing area and the same tail area as today's Constellations, but overall length will be run out from 95 feet 13/16 inches to 113 feet seven inches. This will be accomplished by splitting the fuselage at the front beam and adding seven ring spaces forward and seven aft.

Lockheed calls 76 seats the standard interior for short and medium domestic operations, 68 for overwater, long-range (2,000 miles) standard version and 46 for a de luxe "Siesta" long-ranger, "Siesta" being Lockheed's name for the type of seat Pan American World Airways introduced as the sleeperette and had the foresight to protect by registering the name. Lockheed's domestic coach interior is 102 seats, but this can be boosted to 110 in a pinch.

Almost any seat configuration is possible, however, and EAL has chosen a 92-seat arrangement, incorporating 13 rows of five seats across (three and two) along with 10 seats of double seats and seven lounge seats. The latter, which will have table equipment, will mark the first installation of a lounge in the tail of a Constellation.

The longer fuselage also will lift the space in the two belly cargo compartments to 680 cubic feet as contrasted with the present Constellation's 434 cubic feet. The additional 312 cubic feet (Lockheed's formula is roughly 12 lbs. to the cubic foot) will provide ample space for the additional baggage requirements of 85 to 92 passengers (depending upon whether EAL sells the lounge) and have room left over for greater volumes of mail, express and/or freight.

Break-Even Scale

Lockheed's sales engineering staff has worked out examples of "break-even" requirements on the new craft. At a first-class fare of 6c per mile, it is estimated a standard 76-passenger L-1049 in short or medium range

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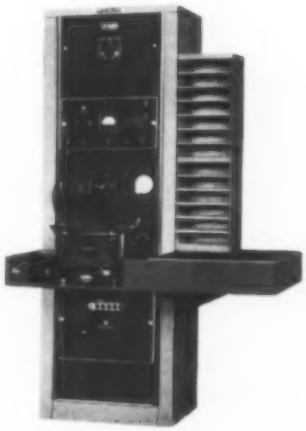

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should break-even on direct operating costs at a passenger load factor of 24% or 18 passengers. This would leave a possible 58 fares plus cargo revenues for overhead and profit. At 4½c per mile, a 102-passenger coach would break even at a load factor of 23.6%, or 24 passengers, leaving 78 fares plus cargo for overhead and profit.

The Lockheed engineers calculate a typical capacity payload at 21,500 lbs. and they figure the potential passenger revenue after direct operating cost at $3.50 per plane mile.

The Super Constellation will have two passenger doors, one being the familiar 27 x 65 inch sliding-type door located on the left side aft of the wing and the other being a forward door which will hinge to the outside. This forward door will speed up the deplaning of passengers and it will be handy for servicing the buffet, which will be located immediately opposite the forward door.

Expected to strike the fancy of passengers who like to get an eyeful will be the replacement of the conventional porthole windows with square-type of considerably wider vision. These windows will be 16 x 18 inches and will be of double pane construction in non-crazing plastic.

Lockheed hasn't forgotten the crew in working out improvements in the new plane and is increasing vision by almost 20% with revisions in the cab top. Windshield and window height is increased from 12 to 14 inches and in addition the number of panels in the cab is reduced from nine to seven to make for clearer vision by the elimination of the two separation strips.

Stressed for Turboprop

Lockheed is designing the L-1049 so that it later can be converted to turboprop power. For this reason, the cabin will be stressed for normal cruise at 25,000 feet altitude and the cabin pressure differential of the pressurization and air conditioning system, which AiResearch Manufacturing Co. will supply, will be boosted from 4.1 psi to 5.6 psi and also will be engineered to pump 140 lbs. of air per minute or about 40 lbs. more than in the present Connies.

Anti-icing efficiency of the L-1049 will be increased by the installation of the B. F. Goodrich Co.'s new-type anti-icing boot in which the stagnation point at the leading edge is electrically heated and the supplemental air tubes operate at higher pressures, 20 psi.

Maximum gross weight of the L-1049 will be 116,000 lbs. Landing weight will be 96,500 lbs. and the plane empty will weigh in at 65,000 lbs. The increased weights will require a new main landing gear and a new nose strut, but the wheels will remain the same.

The new-type Constellation will be powered by Wright CA18 engines which develop 2,700 hp at takeoff. Propellers will be Hamilton Standard's three-bladed, 15-foot one-inch, reversible, high activity, solid dural assemblies using 6869A-0 blades and 4360 hubs.

CAR sea level takeoff length for the L-1049 at maximum gross of 116,000 lbs. will be 5,600 feet. Maximum cruising speed at 21,500 feet at 1,500 hp will be 321 mph and stalling speed with flaps will be 94.5 mph.

Although the L-749B is scheduled to be Lockheed's entry for real long range, the L-1049 will be given a highly respectable range through the addition of 750 gallons to the fuel capacity. This increase in the total fuel capacity to 6,570 gallons will be accomplished by installing five cells in the center section. This in turn will involve a modification to the use of machine plate construction, with 14ST, in the under side of the wing so as to add two more work openings for easy access into the wing for maintenance.

For long-range operations (three hours fuel reserve included), the L-1049's range for a capacity load at 10,000 feet and an average cruise speed of 242 mph will be 2,340 miles with a full pay load; 2,920 miles with a full load of passengers. Range at 20,000 feet altitude and average cruise speed of 318 mph for 40 passengers will be 3,420 miles.

Lockheed sums up the L-1049 this way: 40% more payload, 8% more power, 11% more fuel, 35% more passenger capacity, 72% more cargo capacity.

First Take-off—The de Havilland Heron, feeder-type transport, takes to the air on its recent maiden flight at Hatfield, England. The Heron has a maximum weight of 12,500 pounds with a payload of 3,420 pounds. It has a fixed undercarriage, no hydraulic system, unsupercharged engines and a constant speed propeller.

Aviation Calendar

July 14-16—National Pilots Air Meet and Races, Chattanooga Municipal Airport, Chattanooga, Tennessee.

July 17—Conference of National Aviation Organizations first meeting, Washington, D. C.

July 25-30—Academy of Model Aeronautics national model airplane championship contest, Naval Air Station, Dallas, Texas.

July 30-Aug. 13—National soaring contest, Grand Prairie, Texas.

Aug. 1-17—CAB Annual review of airworthiness regulations, Washington, D. C.

Aug. 19—Tennessee Air Progress Conference, Knoxville, Tennessee.

Aug. 19-20—1st Annual California Air Freight Clinic, Oakland, California.

Sept. 2-4—National Air Race date postponed to May 19-20, 1951.

Sept. 4-6—National Flying Farmers Association annual convention, Bemidji, Minnesota.

Sept. 12-14—Conference on Ground Facilities for Air Transportation, Massachusetts Institute of Technology, Cambridge, Massachusetts.

Sept. 28-30—Air Reserve Association annual convention, Hotel Texas, Ft. Worth, Texas.

Sept. 28-30—International Northwest Aviation Council 14th annual convention, Sun Valley, Idaho.

Oct. 2-4—National Association of State Aviation Officials annual convention, Minneapolis, Minnesota.

Oct. 12-13—1950 Conference on Airport Management and Operations, Max Westheimer Field, North Campus, University of Oklahoma, Norman, Oklahoma.

Oct. 17-18—Third annual New York State Airport Management Conference, Syracuse, New York.

Oct. 19-29—Tennessee Aviation Conference, Knoxville, Tennessee.

Oct. 26-27—Fifth Annual Aviation Conference, Tucson, Arizona.

Nov. 30—Airport Fire Safety Clinic, sponsored by the Committee on Aviation and Airport Fire Protection, National Fire Protection Ass'n, Baker Hotel, Dallas, Texas.

International

Sept. 4-10—Society of British Aircraft Constructors annual flying display and exhibition, Farnborough, England.

Oct. 12—IATA Executive Committee meeting, San Francisco, California.

Oct. 16-20—IATA Annual general meeting, Fairmont Hotel, San Francisco, California.

Oct. 23—IATA Executive Committee meeting, Montreal, Quebec.

October—ICAO Rules of the Air/Air Traffic Control Division Meeting, Montreal, Quebec.

November—ICAO middle East regional meeting, tentative, location undecided.

November—ICAO Airworthiness/Operations meeting, location undecided.

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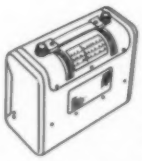

Use the highly versatile LEARAVIAN to fly the airway beams—to get the half-hourly CAA weather reports—to hear the control towers. Use it as a direction finder to guide you to your station. Use it to listen to your favorite standard broadcast program. Use it to entertain your "date" or to navigate your plane. Use it on AC current, DC, or its own self-contained batteries. And best news of all, use it on the batteries as much as you want, because with the unique LEARAVIAN circuit you can recharge them *yourself!* Simply turn the power selector switch to "charge" and plug the attachment cord into any ordinary wall outlet. That's all there is to it. With the LEARAVIAN you get more than four times the normal life out of your batteries.

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Turn on your LEARAVIAN and hear the excellent tone and signal clarity provided by its powerful speaker. Note the durable LEARAVIAN construction ... the beautiful luggage-type case ... the smartly styled design. Note its many convenience features such as the spring-loaded "lay-flat" carrying handle ... the fingertip controls ... the easy reading angle of the dial ... the three-color band-selector switch color-coded to the tuning dial ... the hinged "snap-open" rear panel giving easy access to the attachment cord, battery pack, and chassis.

The LEARAVIAN is truly the finest, most useful portable receiver ever built. Your choice of a rich maroon or tan case. Also available in a handsome mahogany-style case. Weighs only 14 pounds with batteries — 8 pounds without. See it at your local airport or write us for the address of your nearest LEARAVIAN dealer.

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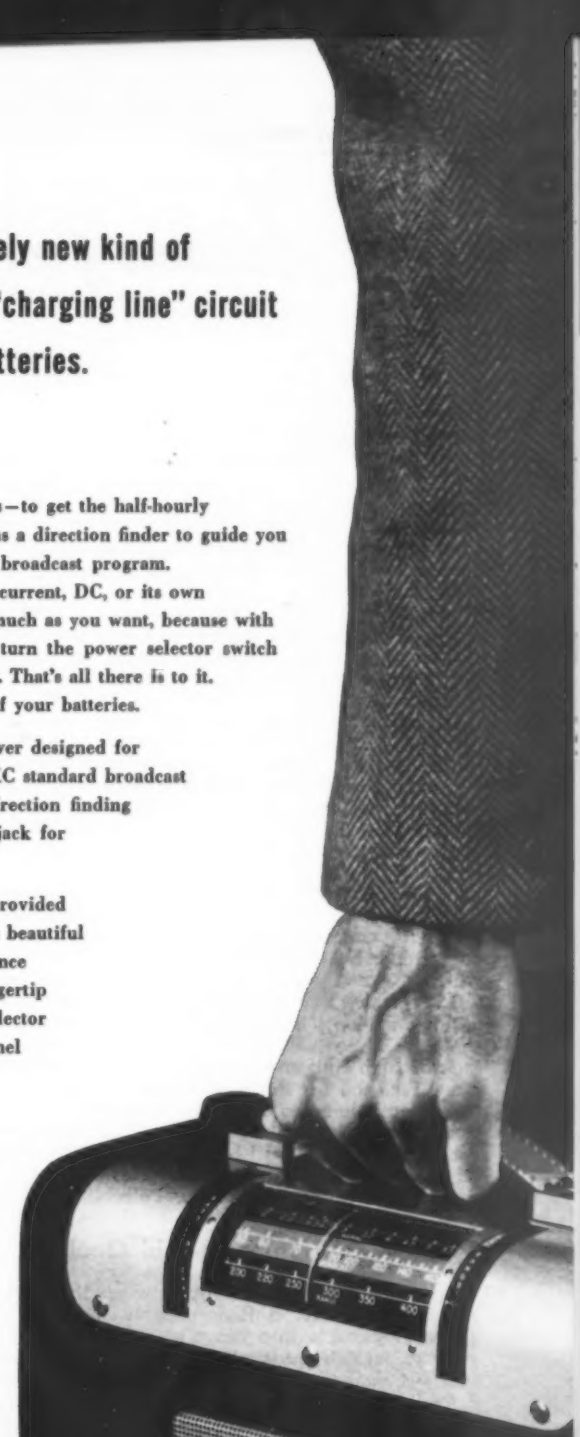

Between the Lines:

Lesson from Korea

By James J. Haggerty, Jr.

AFTER SOME two years of kicking the idea around, the Air Force has finally given a priority to an item which should have been on the priority list some time ago—production of an assault transport airplane.

At various times during the last two years, the USAF planned procurement of assault transports, but somehow the money allocated always seemed to get diverted to other projects.

The Korean situation has pointed up more than ever the need for a large payload assault transport capable of carrying either troops or heavy equipment. When MacArthur's ground troops were ordered into the contest they went by boat from Japan, then by train to the battle area, a process which consumed more than three days, three days in which Red troops gained valuable, hard-to-retake ground. There is no use second-guessing what they might have been able to do had they had a couple of groups of assault transport aircraft to drop them quickly into the battle area; it is obvious, however, that the time saving would have put us in a more advantageous position.

But MacArthur's Army had no assault transports, nor, as a matter of fact, are there any in service. Over the past two years, the grand total of about 35 assault transports have been ordered, 23 of them Northrop C-125's which are not yet in service, and the remainder Chase C-122's which are undergoing service testing.

Now, at long last, behind pressure from the Army, the Air Force has decided to do something about the lack of such equipment. On August 1, at Eglin Air Force Base, Fla., the Air Force will hold a competition between the acceptable types of aircraft available for this purpose, with a production order on tap for the winner. The competing aircraft will be the Chase C-123, a large twin-engine plane, the three-engine Northrop C-125 Raider, and a modified version of the Fairchild C-82 Packet.

All Three Should Qualify

Specifications, worked out between the Army and the Air Force, call for a plane capable of carrying a 16,000-pound payload with a range of 650 miles plus one hour's reserve fuel. It must also be able to land and take off in short distances on unprepared fields or landing strips.

The Chase and Northrop planes were designed from the ground up as assault transports. Of the two, the Chase C-123 is the larger. It has a design gross weight of 54,000 pounds and a useful load of about 30,000 pounds. Range at these weights, however, is only 550 miles; to meet the 650-mile range requirement for this competition the C-123 will have to sacrifice some payload, but it can still meet the 16,000-pound requirement easily. It can take off over a 50-foot obstacle in 1,020 feet and land over a similar obstacle in 1,440 feet. The C-123 can carry 60 combat troops or an equipment load such as a 155-mm howitzer and a truck.

Northrop's C-125, though smaller than the Chase plane, can still meet the specifications. Grossing about 46,000 pounds, it can carry a troop or equipment load up to 20,000 pounds for short hauls. It will have no trouble meeting the range and payload requirements of this competition.

The plane to beat, though, appears to be the Fairchild C-82, not so much because of its performance characteristics but because of a number of other factors which must be taken into consideration.

The assault transport version of the C-82 is a standard Packet with larger flaps, heavier landing gear and an interior stripped of all the items non-essential to short-haul operation—monorail, long range navigation equipment, auto pilot, some fuel tanks, etc. Although it might not be able to match some of the performance characteristics of the two specially-designed assault transports, the Packet's performance and carrying ability satisfy the basic requirements for this competition.

Economy Favors Packet

But the big item in the Packet's favor is economy, and economy is an extremely important factor in these days of tight budgets. The main point is that the Air Force already has 135 C-82's from groups which have been or are being re-equipped with the newer C-119 Packets. These planes can be converted to assault transports for about $45,000 each, about 8% of the cost of a new plane.

There is also the time factor in the C-82's favor. The need for assault transports is pressing. To tool up and get the Chase plane in full production would take at least a year. Northrop's C-125 is already in production but building a new airplane takes considerably more time than ripping the insides out of an old one. Converting the C-82's would be a matter of weeks instead of months, and this time saving is likely to prove a very important point in this competition, in view of the international situation at the moment.

Emergency mobilization is another factor which gives the Packet an edge. Obviously, the 135 Packets available for conversion could not satisfy the demands of a global war. But Fairchild could swing into production on an assault transport version of the later Packet, the C-119, a plane which is already being produced in quantity.

The C-82 also has the advantage in maintenance and operating experience. Packets have been in service for some time, crews are familiar with their operation, maintenance on both the C-82 and C-119 has become standardized and spares are available in quantity.

A point in favor of building the Chase plane might be the desirability of having more than one manufacturer in the assault transport business in case of mobilization. Northrop is already building the C-125, Fairchild will go on building the C-119 whether or not it wins this competition, but Chase's production, so far confined to a dozen C-122 small assault transports, is at low ebb.

So the flying competition at Eglin AFB will probably prove only that all three airplanes qualify and that there is little difference in their respective performance characteristics. The winner will probably be decided by an evaluation of the other factors mentioned. At any rate it is nice to know that we are finally going to do something about filling a large gap in military aviation.

(Between the Lines Continued on page 21).

Attack on Jets

THE RINGSIDE pundits, observing the war in Korea from afar, have come up with two conclusions which are getting considerable publicity: 1) jet aircraft are no good for ground support operations and 2) the Korean battle has emphasized that the Air Force has been neglecting tactical aviation. We can find no basis for either assumption.

First, it must be admitted that the Lockheed F-80's flying out of Japan have been singularly unimpressive as contra-troop weapons. However, the trouble has not been in the design of the airplane or in what the pundits, apparently unaware that the plane has a throttle, call its excessive speed. The basic problem has been *range*. Unable to use bases in Southern Korea, the F-80's have been forced to fly from Japanese bases to targets some 400 miles away. On top of this, bad weather has forced them to fly almost the entire distance "on the deck" where the specific fuel consumption of a jet airplane leaves something to be desired.

Even with tip tanks, the 80's do not have the range to handle this type of assignment. In the Korean strikes they have just enough fuel for a few minutes over the target before they are forced to turn for home.

However, the fact that the earliest model USAF jet, and the one with the shortest range, is not adaptable to this type of warfare does not prove that jets are no good for ground support. In Korea, as everywhere else, the jets have proved that they make a very efficient gun and rocket firing platform. They need either closer bases or longer range, and in the Republic F-84E the Air Force has a plane with a combat radius of over 1,000 miles. It is very unfortunate that, at a time when they are needed the most, the F-84E's are grounded because of engine trouble (faulty No. 2 bearings in the Allison J-35 engines).

The F-84E is also the answer to the charge that the Air Force has neglected tactical aviation, as we have stated before in these dispatches. In tactical exercises, the F-84E has proved to both Army and Air Force brass that it is an extremely efficient ground support weapon.

At the moment we are faced with the ignominious possibility of World War II piston-engine aircraft, such as the North American F-51 Mustang, taking over the ground support work, since their longer range will permit longer time over the target. But we are confident that if the weather gets better, permitting the 80's to take advantage of the more efficient fuel consumption rate possible at higher altitudes and thereby allowing greater endurance, or if the F-84E's are ungrounded in time to participate, jet aircraft will vindicate themselves and the Air Force.

PRODUCTION SPOTLIGHT

New Jet Orders? The Mutual Defense Assistance Program, which hitherto has meant little in the way of business to aircraft manufacturers, except for small overhaul contracts, may now turn out to be a source of new procurement funds under a plan being considered in the Pentagon whereby certain MDAP beneficiary countries would be provided with jet aircraft.

If the plan is approved, MDAP countries will get quantities of two first line USAF jet fighters, the **Lockheed F-80** and the **Republic F-84,** and possibly two Navy fighters, the **Chance Vought F6U** and **North American FJ,** both jet types. Details of the plan have not yet been worked out, but the planes would probably be taken directly from USAF and Navy inventories. Groups now using these plane types are either in the process of being re-equipped with later types or are scheduled for re-equipment, with the exception of late model F-84's. Upon being re-equipped, they would probably turn their old planes over to MDAP for distribution. The USAF would then be reimbursed from MDAP funds for the planes, providing money for the purchase of new, later model types.

Under the pending MDAP bill in Congress, foreign countries would get $1,222,500,000 for arms, $309,533,133 of which is for aviation equipment. It is not immediately determinable what portion of this will be diverted to new procurement, but estimates range up to 50%. The remainder would be spent to overhaul stockpile aircraft being shipped under MDAP, accessories, radio and electronics and spares.

Engine Progress: *The rapid trend in jet engine development is highlighted by the fact that three engines in the 10,000-12,000 pound thrust category have now reached the test stand stage. The engines, two American and one British, are the Pratt & Whitney J-57 and the General Electric J-53, both USAF projects, and the Rolls Royce AJ-105.*

Flight Test: **Northrop Aircraft** is now running tests on its three-engined C-125 Raider assault transport using JATO units for assisted take-off. At a gross weight of 40,000 pounds the C-125 can take off in less than 500 feet and clear a 50-foot obstacle in less than 1,000 feet with the use of six JATO rockets. Because the C-125 is a high-wing plane, the rockets are attached to bars which tie to the fuselage and help support the plane's fixed gear; three rockets are mounted on each side of the fuselage . . . **Sikorsky Aircraft Division's** latest helicopter, the YH-18, has completed its first series of test flights and tie-down tests. The plane has been torn down for inspection prior to delivery. Sikorsky is building four YH-18's for the Army. The YH-18, known commercially as the S-52-2 and in the Navy as the HO5S, is a four-place single-rotor helicopter powered by a 245 horsepower Franklin engine . . . **Consolidated Vultee** has now made four test flights with the XP5Y-1 Navy turbo-prop flying boat. Like the previous flights, No. 4 was relatively short, 17 minutes. Convair has encountered some "bugs" in the Allison T-40 engines . . . Convair's XC-99, sister ship of the B-36 bomber and the world's largest land-based transport, has completed its first flight since it was damaged by a static electricity caused wing tank explosion some time ago. The plane is at Kelly AFB, San Antonio, Tex.

B-36 Turboprop: *Recent press reports setting a 1952 flight date for the turboprop version of the Convair B-36 are somewhat premature, inasmuch as Convair has received no contract for such a plane. The whole question of whether to go ahead with the project is still up in the air, but indications are that at least an experimental turboprop B-36 program will be initiated. Most prominent power plant being mentioned is Pratt & Whitney's PT-2, which develops just under 6,000 horsepower, one-third more than the most powerful piston-engine slated for B-36 installation.*

Overload Tests: **Boeing Airplane Co.** has completed a series of overload tests with a C-97A Stratofreighter and a B-50 Superfortress. In one test the C-97A took off at a gross weight of 174,500 pounds, carrying 96,500 pounds of useful load. Normal gross weight is 148,000 pounds; empty weight is 78,000 pounds. The B-50 was flown at a gross weight of 173,000 pounds. Normal gross is 164,000 pounds. The C-97A was put through its tests at Edwards AFB, Muroc, Calif., while the B-50 flew from Moses Lake AFB, Wash. Water ballast was used to simulate heavy cargo.

—J. J. H.

Arithmetic Of The Triangle . . .

Convair's Supersonic Delta Wing

By RICHARD G. WORCESTER

THE CONVAIR F-92 is a bold and radical step to explore the practicability of the delta wing for military purposes. Results of free flight trials at Edwards (Muroc) have produced some factual basis upon which the military can decide whether to write any more delta wing specifications for fighter and bomber types of the coming era.

There is wide measure of agreement that a swept leading edge is the key to minimizing transonic drag. Controversy centers more upon what to do with the trailing edge. Should the wing have a 35-degree sweep like the Lockheed F-90 or should the wing sweep be sharper and the trailing edge filled in? An untriangulated wing of 60 degrees would be geometrically clumsy, but this in itself is no deterrent if the speed extreme characteristics make it worth while.

Filling in the trailing edge of a 45-degree sweep as in the Avro 707, and presumably in Avro's 120,000 lb. jet bomber under development, provides very different flying characteristics from the classic Lippitch and Convair 60-degree triangles. According to tunnel reports the 45-degree triangle —unlike the 60-degree wing—requires landing flaps and reveals more than a trace of tip stalling. With some thickness-chord ratios there is also a strong aerodynamic outwash over the controls. The 45-degree wing may appear to be a more cautious, and therefore attractive, approach to this strange new branch of aerodynamics.

Angle of Attack

The large angle of attack in any delta wing goes to the heart of the matter militarily. The USAF has got accustomed to big changes in the angle of attack with speed of the 35-degree swept wing, but the delta wing is rather different. The stall of the F-92 comes at 29 degrees and it is still doubtful whether such a large angle is acceptable in combat. As no delta wing fighter has yet flown—nor is likely to fly for some time—the question is still largely academic.

Choice of the delta wing for a bomber might prove more rewarding because the disadvantage of the high angle of attack is more than offset by security afforded by the difficulty of a fighter to maneuver and lay aim in transonic turbulence.

The F-92 has a thickness-chord ratio of 6% constant, and so, even if the triangle were not the best arrangement, this thin wing alone would account for the supersonic capabilities of the aircraft which were referred to a month ago in these columns.

Another aspect of the controversy is the matter of structure weight. It is claimed that the reduced weight of the structure in the wing as a result of the inherent simplicity is more than outweighed by the extra stiffening needed internally to hold the profile near the wingroot. The effect of internally bracing a very long chord is, however, still a matter of opinion and selected design comparisons will yield different results—which can be made to prove anything or nothing.

Convair has found that with its design there is considerable saving in weight for a given strength and gust factor and it is not all lost by the need to use an additional spar in the mid-chord position. The first spar is at 5%, the middle one at 40%, and the third comes at 90% on the control surface hinge line. Chordwise stiffeners run at right angles to the middle spar and form a series of diagonal members which contribute to bending and torsional loads on the wing, besides maintaining its profile at high speed.

Conventional Materials

The swept leading edge of the vertical surface has a symmetrical airfoil section and has been kept the same as on the mainwing. It appears that in this particular aircraft the wing sets up a curious kind of spiral airflow in flight and so the position and shape of the three trailing edges were critical. The square-cut line eventually adopted was dictated by the low speed effects of this helical flow. And, incidentally, it looks right.

The whole aeroelastic concept of the delta wing is more in keeping with the high structure loads at sonic speeds and it has been possible to build Convair's triangle with an extraordinary rigidity using conventional materials such as 75S. As a direct result of this, the limits to performance are fixed by what these materials will withstand and not from compressibility buffeting. Thus the ball which has long been in the aerodynamic man's court has now been tossed across in the direction of the structural engineers where it is likely to remain if the painful difficulties of biting out the stainless steel structure of the Bell X-2 is any indication.

Smooth Mach 1 Ride—According to reports the supersonic flights of the Convair F-92 have not encountered buffeting. The aircraft is being re-engined for further trials and the more powerful jet should reduce the angle of dive necessary to reach sonic speed.

Another limitation is lack of power. Recently the F-92 suffered a mishap and opportunity is being used during repair to mount a more powerful jet. If 10,000 lbs. of thrust from an engine and afterburning are realized, a level speed of M 1.3 may be expected. But speeds of this order will call for re-examination of the structure; the intake profile, for instance, needs further internal bracing.

High Rate of Roll

As regards its flying characteristics, the F-92 has a high rate of roll and the pilot is carried up to Mach 1.1 with none of the vicious trim changes of the 35-degree conventional aircraft. Once pilots get used to the high angle of attack they apparently do not notice it. The stall is marked by a high rate of sink and a mushing effect rather than any sudden or gradual flow breakaway. The stall comes at about 95 mph TAS (what it reads on the indicator at 29 degrees angle of attack is anybody's guess!) and the maximum speed is 630-640 mph with the Allison J-35 turbine.

Radar Tester—This 30-ft. high, 300-lb. plastic tower, believed to be the largest ever built, is being used by Airborne Instruments Laboratory, Mineola, N. Y., to test performance of latest type faired-in radio and radar antennae for supersonic aircraft.

Model airplanes up to 8 feet in wingspread and 50 pounds in weight are revolved in simulated flight at top of the tower. An amplifier, smaller than a cigaret package, installed in the model plane, transmits signals from the "airborne" antennae under test to recording mechanisms manned by AIL men on the ground.

Design Trends

By Richard G. Worcester

THE THREE-YEAR hiatus in U. S. turboprop development provides an object lesson in the arithmetic of elementary planning with a few sidelights in psychology thrown in. It is fashionable to blame the military, but shrugging it off in this way does them less than justice. The armed services academically lay down their basic requirements and the manufacturers then have it in their power to mould military opinion as to the sort of conditions which are likely to be met. They can also infuse a realistic atmosphere into offices usually remote from the whoosh of jets where military men work by spontaneity rather than by precise reasoning.

History has shown that it is nearly always a mistake to be obsessed by any one line of development—however promising it might be. Xerxes misguidedly put his faith into the bridge of boats across the Hellespont; the Germans were obsessed by rockets and were hammered to death in 1945 by the obsolete Merlin and Cyclone. The Pentagon has been hypnotized by the jet engine and it is odd to reflect how it was not quixotic enough to believe that things are not always what they seem. The civil operators—who base their requirements on modified military engines—have been frankly bewildered by the way technicians contradict each other at every turn.

The operational planning departments work in secret but all the world knows the situation in which the military now finds itself, and the minimum of imagination is needed to know in broad outline what the coming years will bring. The fighter which they should be asking for now is one which can operate from a polar cap, or an Army truck, or a small barren island without runways. So it must be able to take off or land without forward run and fly at a sonic speed for two hours. To do this it must be light and mobile—weighing perhaps one-third of the existing monsters. The bomber must be able to fly at a sonic speed with an indefinite range sufficient to strike any point on the globe and return. The Navy needs a combined strike and patrol flying boat to work with the surface ships and ultimately replace them entirely. Air defense must be entrusted to small fighters operating from platforms on the decks of commercial vessels. The military air transport services must be able to carry the heaviest and bulkiest single components which go to make up the land, sea and air forces' equipment (and all must fly using an unjammable world-wide navigation network accurate anywhere to within a mile).

Now the question is: what sort of propulsion plants are going to be needed? Who can possibly say that one basic principle is more promising than another? The rocket-ramjet, the diesel-gas turbine, the ducted and unducted fan, the pure jet in its various forms, the 2- and 4-stroke gasoline engine with compounding slave turbines, the pure delta-diesel? A common error made when measuring the efficiency of one design against another is the reliance upon small differences in performance figures which are themselves only approximate forecasts. There is also a real possibility of oversimplification due to the sheer complexity of the issues.

The manufacturers and the military must never again forget the simple rule that the need for research multiplies with its products. All planning calls for certain habits of thought and, in the light of past mistakes, there is one vital piece of advice to bear in mind. It is, surely, that doubt rather than conviction is the only realistic way to anticipate future developments in an age which suffers from an excess of didacticism.

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It is not widely realized—even in England—that the problems of the Brabazon and Comet acted as a tonic to the material suppliers and fringe industries who supply small components. To meet the Brabazon's requirements in nearly every case required the designers to return to fundamentals and as a result they were able to improve their products out of all recognition. So even if the Brab. never flew, the added knowledge was a priceless asset to their industry. The moral: France should build a 300,000-lb. "Super-Armagnac."

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The yardstick of success in Navy design is a clean aircraft. The yardstick of success in Navy service is a dirty aircraft. The Navy wants to strew the wing with rockets, torpedoes, mines, sono-buoys, depth charges, drop tanks and radomes.

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Which Is 'Cleanest'?

Basic Design Comparison of U. S.-British Transports

The figures in these tables are noteworthy for two reasons; first they are of intrinsic interest because the primary strength and aerodynamic data have not appeared in print before and, second, because this arrangement provides some basis for comparison between U. S. and English practice.

Only broad design characteristics are revealed and the figures do not pretend to tell the full story.

The list of aircraft is not, of course, complete and when figures for the Martin 404, the D. H. Comet, the Avro Jetliner and other aircraft become available amendments will be added to this basic list.

One thing, above all, the tables show is that improvement in basic design has steadily been realized, and that aircraft design is a sufficiently rationalized science for there to be corresponding advancement in Great Britain. Approximately similar results are also to be expected from other countries like Holland, the USSR, and France which have not been included.

Look, for instance at the lift coefficient figures—how much higher they are now than they used to be. As stalling speeds are not coming down but rising, it is clear that all the improvement in lift is being used to step up wing loadings rather than lower landing speeds. This trend matches the increasing length (and thickness) of runways.

The position of the giant transports carries a significant lesson. Often the efficiency increases with the gross weight but above a certain point the sheer size of the product offsets its inherent advantage. A typical example is in the undercarriage weight.

Possibly the tables show that materials must match more closely the role and size, and if improvisations are made, such as using aluminum for supersonic aircraft or using existing materials on outsize aircraft, it becomes increasingly harder for the designer to avoid a design penalty.

—R. G. W.

Wing Criteria

This table arranges the aircraft in order of wing weight expressed as a percentage of the maximum permitted weight and relates this to the lift coefficient, and the design factor. (American transports in bold face).

Aircraft	Wing % of Gross Weight	CLmax (flaps down, power on)	Strength Factor
DC-6	8.0	2.6	1.5*
DC-6B	8.1	2.6	1.5*
Marathon	9.6	1.91	4.44
Viking	9.9	1.87	4.0
C-97A Stratofreighter	10.1	†	2.5§
Stratocruiser	10.3	†	2.5§
Convair Liner	10.3	2.57†	4.46
Constellation 749A	10.4	3.84	2.5§
Dove	10.5	1.75	5.1
C-124A	10.7	2.5	1.5*
Viscount	10.7	2.4	5.0
Solent 4	10.8	1.9	3.75
Hastings	11.0	2.05	3.75
Hermes 4	11.2	2.05	4.15
Prince	12.45	1.45	4.89
Super-DC-3	12.5	2.4	5.1
Apollo	12.5	2.05	1.5*
Ambassador	12.98	2.24	4.48
C-99	13.5	2.01‡	2.67§
Brabazon I	13.74	2.13	3.75
C-125	14.0	2.6	+2.6 / −1.0
SR-45 Princess (not flown)	14.5	†	†
Bristol 170 Wayfarer	15.62	1.78	3.87

‡ Power off
§ Presumably excludes CAR "factor of safety"
* Refers only to the CAR "factor of safety"
† Not known

NOTES—There is a high degree of scatter due probably to the loose interpretation of the word "wing." The U. S. shows, however, it can build wings lighter, as strong and with a higher lift coefficient than the British. Note the very close thinking on the three 300,000-lb. transports.

The Cleanest Transports

This table arranges the aircraft in order of parasite drag expressed in pounds at 100 ft/sec and related to gross weight. A figure estimated by AMERICAN AVIATION for the Comet has been inserted for general comparison.

Aircraft	Parasite drag D-100 (lb.)	Maximum gross weight (lb.)
Dove	113	8,500
Prince	143	10,650
Marathon	166	18,000
Convair Liner	206	43,200
Apollo	206	43,000
Comet	212*	105,000
Super-DC-3	220	31,000
Viscount	224	48,000
Viking	240	34,000
Ambassador	265	52,000
DC-6	300	97,200
DC-6B	310	100,000
Hastings	400	73,000
Hermes 4	400	82,000
Constellation 749A	414	107,000
C-125	480	45,600
Bristol 170 Wayfarer	485	40,000
Solent 4	540	79,000
C-124A Globemaster II	640	175,000
Stratocruiser	†	145,800
C-97A Stratofreighter	†	150,000
SR-45 Princess (not flown)	1,000*	315,000
Brabazon I	1,189	290,000
C-99	1,260	265,000

* Estimated
† Not known

NOTES—There are several big surprises here. Notice how the extra deck has cost the C-99 less than 100 lb. over the Brabazon. The Connie, despite its fine lines is not nearly so clean as the DC-6 and 6B. Assuming the fuselages are roughly similar the drag of two Mamba turbines is about equal to one R2800 on each wing of the Apollo and Convair 240. Notice the enormous penalty if the undercarriage is not retractable (C-125 and Bristol 170).

Bad Weather Landing Data

This table arranges the aircraft in order of stalling speed and related to wing loading and pilot's forward view expressed as the number of degrees of visibility over the nose and downwards. Results in this table should be compared with the undercarriage strength as blind landings are dependent upon high energy absorption.

Aircraft	Stalling speed mph TAS	Wing loading lb./sq. ft.	Forward view degrees
C-125	59	33.6	22
Prince	74	29.2	16
Dove	75	25.4	18
Bristol 170 Wayfarer	76.7	26.9	15
Apollo	81	43.7	17
Super-DC-3	85	32	18
Marathon	86	36.14	25
Ambassador	87	43.3	15
Viking	90	38.5	20
Viscount	90	49.8	12
Constellation 749A	91	64.9	22
C-99	93	55.5	45*
Stratocruiser	95	84.8	30†
C-97A Stratofreighter	95	87.2	30†
Convair Liner	97.5	53	29‡
SR-45 Princess (not flown)	98	62.8	17
Solent 4	98	46.8	18
Brabazon I	99	53.5	15
DC-6	103	66.4	12
Hastings	103	55.5	12
Hermes 4	105	58.25	11
DC-6B	106	68.4	12
C-124A Globemaster II	111	69.7	18

* Presumably refers to the upward and downward angle.
‡ Refers to the upward and downward angle.
† Approximate.

NOTES—Wing loadings and stalling speeds are undeniably high these days, but the worst are the 150,000-lb. and not the 300,000-lb. transports. The C-125 and Bristol 170 show up well in this table. The extra transparent panel under the pilots in the Stratocruiser gives this type by far the best downward view.

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• MANY EXECUTIVE aircraft owners . . . business men who must get to their appointments quickly . . . have been so interested in obtaining the Sperry Zero Reader* for their planes . . . that several of the first instruments to come off the production line have been allocated to them.

• Developed by Sperry with the cooperation and encouragement of All-Weather Flying Division, USAF, and the Air Transport Association, the Zero Reader is finding wide acceptance with leaders in industry who find it profitable to have their own aircraft. And the pilots of these planes are getting new assurance of on-schedule flying and landings with this instrument. They find that the actual job of piloting and making manual instrument approaches is greatly simplified.

• The Zero Reader supplies information from five essential instruments . . . presents all this data on one indicator—heading, altitude, attitude, and instrument landing information. The pilot merely "zeros" two instrument pointers and is relieved of all complex mental calculations. The difficult task of making a manual approach on Instrument Landing Systems becomes a routine procedure.

• Our nearest district office will be glad to give you full information.

Among the many companies that have purchased a Sperry Zero Reader for their executive aircraft are:

- Bethlehem Steel Co.—Lockheed Lodestar
- W. K. Carpenter—Beechcraft
- Avco Manufacturing Corp.—Lockheed Lodestar
- Texas Eastern Transmission Corp. Douglas DC 3
- Briggs Manufacturing Co.—Grumman Mallard
- Champion Spark Plug Co.—Beechcraft
- Gaylord Container Corp.—North American B-25 and Beechcraft
- C. F. Kettering, Inc.—Grumman Mallard
- Union Producing Co.—Douglas DC 3 and Lockheed Lodestar
- General Electric Co.—Douglas B 23
- The Fuller Brush Co.—Grumman Mallard
- General Mills, Inc.—Douglas DC 3
- Signal Oil and Gas Co.—Douglas DC 3
- Arthur Godfrey Productions, Inc. Douglas DC 3
- Plymouth Oil Co.—Douglas DC 3

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New Standards on Trial . . .

Three Lines Start Maintenance Experiment

By WILLIAM D. PERREAULT

THREE of the "Big Four" airlines are now starting a major experiment in the field of aircraft maintenance. United, American and Trans World Airlines are proceeding with a new maintenance standards plan which might well revolutionize the present concept of airline maintenance.

For many years the airlines have been required to establish specific times at which aircraft engines, propellers, airframes and components will be completely overhauled. Starting at a conservative time increment when a new piece of equipment was designed or first introduced into service, each line had to move from this position at a slow and costly pace.

In recent times Aviation Safety Release 209 has outlined the procedure by which extensions to the basic overhaul time could be obtained. At best these procedures are drawn out and complicated. They accurately reflect the serious manner in which CAA carries out its edict to insure air safety.

For several years CAA and airline maintenance supervisors, through ATA, have attempted to arrive at a system providing an equal level of safety but less burdensome to the operator. On several occasions agreement seemed imminent but final details could not be reached to the mutual satisfaction of all groups.

Agreement Reached

On April 19 CAA issued authorization to these three airlines, with the mutual agreement of other operators, to set up their own maintenance standards plan for a trial operation. The authorization is good for nine months. During this time each of the three lines will be relieved of many of the formalities in ASR 209. Each was to submit a proposed program to CAA for approval prior to starting the operation.

All three lines have now done this. Under the terms of the agreement, adjustments in the overhaul periods on all aircraft and engine parts will be based on the past operating record. Working with the local CAA agent (inspectors) the airline will be able to increase overhaul periods as the service record justifies.

But each line will have a danger signal. Monitoring of the premature removal and/or overhaul of units will warn the operators if they are exceeding the practical service life of the parts. The establishment of this danger signal or flag has been accomplished in three different ways by the three lines.

This is an ideal condition since the whole purpose of the test is to arrive at a usable, effective system. There is every likelihood that none of the three systems will ever be adopted on an industry-wide basis. Instead they will form the basis for one or more systems directly applicable to the varying needs of large and small airlines, domestic and international.

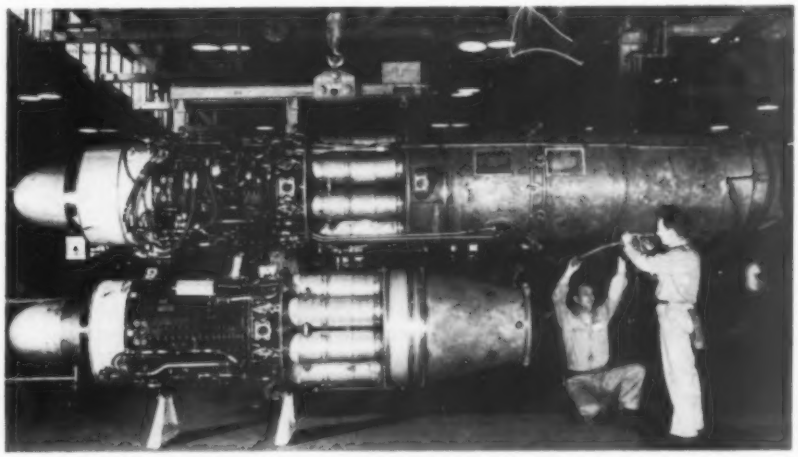
This principle is reflected in the policy requirement that the individual airline change its system, as experience dictates, as promptly as possible. Operation of the plan will normally serve as the only substantiation of changes required but in special cases the CAA agent may require further proof to substantiate a change. This means that the individual airline formulas may undergo changes even within the trial period.

United's Plan

United Air Lines will base its program for setting overhaul times on this basis: summation of time on failed units divided by total unit flying time, the answer to be expressed in percentage. Using this system UAL will not include among the failed units those which represent induced failures (failures brought on by other conditions), irregular removals which prove OK on bench test or those which adjustment, not overhaul, permit to be placed back in service.

Normally, it will not be necessary to work this formula out for each item. When United's records show that the failure rate on a given item exceeds .5 failures per 1,000 hours operation this will serve as a signal to check the over-all unit record by the method shown. If 35% or less is obtained by applying the formula, no further action will be taken.

In the event that a figure higher than 35% is obtained, the airline will be given three months in which to bring the condition within control. Otherwise the overhaul period will have to be reduced to the previous value, or if no previous value existed then reduced by 100 hours. Components overhauled in conjunction with a second or third overhaul would be moved back one full overhaul period



Afterburner—This photo illustrates the added length of a jet engine installation when an afterburner is added. The installation at the top is a General Electric J-47 engine with an afterburner, such as that used in the North American F-95A, compared with the ordinary J-47 below it. The afterburner is used to re-heat the exhaust gases by burning additional fuel in the tail-pipe, thereby greatly augmenting the engine's normal thrust. Note the nozzle at the end of the afterburner by means of which the area through which the exhaust passes is automatically increased and decreased to get optimum performance under varying power and flight conditions.

TECHNICAL NEWS DIGEST

• **Durham Aircraft Service, Inc.,** Woodside, N. Y., has acquired equipment and facilities of Engine Air Service, Inc., Mineola, N. Y. George E. Staley has been named manager of the Mineola branch, which is valued at $250,000.

• **Rules for Air Transport Association's 1950 awards** to airline employes adjudged to have made greatest contribution to research in meteorology and dispatching have been liberalized so that research conducted by pilots, meteorologists and dispatchers in collaboration with supervisory personnel can qualify. Entries must be sent by registered mail to Secretary, Meteorological Committee, ATA, 1107 Sixteenth St., N.W., Washington 6, not later than January 31, 1951.

• **Early establishment of a Pacific network of ocean** weather ships has been agreed upon by the United States and Canada, with fivc stations to be operated by the U. S. and one by Canada. In addition, Japan will continue to operate one weather ship in the far western Pacific.

• **CAB's report on the Capital Airlines** accident in the Potomac River last December 12 found that the cause of the accident was "the stalling of the aircraft at an altitude too low to permit a recovery." The Board said it appeared Capt. William J. Davis, who was killed in the mishap, "did not give enough attention to all of the flight instruments . . ."

• **Continental Air Lines and Mechanics Union,** Local 1030, have agreed upon a wage increase of 3c per hour retroactive to May 1, 1950, and an additional 2c per hour effective May 1, 1951, to May 1, 1952.

• **The new British military transport,** the GAL 60, built by Blackburn & General Aircraft, Ltd., has successfully completed its first test flights at Brough, East Yorkshire. Powered by four Bristol Hercules engines, the plane has a span of 162 feet and is 99 feet long.

• **Pending delivery of its first Super DC-3,** scheduled about July 23, Capital Airlines has borrowed Douglas Aircraft Co.'s prototype plane for route checks and pilot training. All tests for type certificates for the Super DC-3 were completed in late June, and actual issuance of the certificate is expected about this week. Certificated gross weight may be in excess of 31,000 pounds.

• **Pacific Airmotive Corp.** has been awarded a $250,000 Air Force contract for major overhaul of an undisclosed number of Pratt & Whitney R-1830-92 engines. Work will be done at PAC's Burbank plant.

• **Delta Air Lines has ordered another** Douglas DC-6, its seventh, to be delivered in January. The new airplane, costing approximately $900,000, will be stressed to take turbo-prop engines, Delta said. In making the announcement, Delta officials said turboprop engines would raise cruising speed of the DC-6 from 312 mph to 380 mph.

• **Minneapolis-Honeywell Regulator Co. has shifted** the base for its aircraft fleet operation to a new hangar at Wold-Chamberlain Field in Minneapolis. M-H previously maintained a smaller hangar on the same field but has now rented the larger facility from Northwest Airlines.

• **The Douglas A2D Skyshark,** the Navy's turboprop fighter which recently made its first flight test, uses a 17-pound AiResearch pneumatic starter which starts the 5,500-horsepower engine in 30 seconds. A small AiResearch gas turbine, weighing about 150 pounds, supplies the power, about 35 hp., required to turn the starter at 30,000 rpm.

• **Manufacturing activities of the American Magnesium Corp.,** the magnesium fabricating subsidiary of ALCOA, were assumed by the Aluminum Company of America effective June 1.

• **Sale of nearly a quarter of a million dollars** worth of cabin pressurization equipment to Pan American World Airways for 14 L-049 Constellations has been announced by Stratos Corp., a subsidiary of the Fairchild Engine and Airplane Corp. The Model S60 units will supplement Stratos equipment already operated by PAA. Pan Am has CAA approval for 1,000-hour overhaul periods on the earlier equipment.

where adjustment was applicable.

TWA's Plan

TWA's plan is very much like United's except for the base. TWA's formula looks like this: summation of actual time of unscheduled removals divided by the summation of expected time on unscheduled removals, expressed in percentage. TWA would use an unscheduled removal figure of 1.5 per 1,000 hours as a flag, after which the formula would be called on.

It might be noted that the higher allowable figure per 1,000 hours reflects the fact that *all* unscheduled removals are counted. In TWA's case percentages in excess of 50% will be considered cause for reducing approved overhaul times on the same basis as expressed by United.

American's Plan

American will maintain a record of defective units which are subject to unscheduled removal each month. Twenty-five percent will be considered a datum line. Allowing for 5% leeway, American will use any three successive months in which the percentage of defective units exceeds 30% as a flag. At this time AA will analyze the failures which have occurred and determine whether or not the length of service was a contributing factor to the failure. If so steps will be taken to reduce the overhaul time accordingly.

These are the three basic plans. There is enough variation in the systems to provide a reasonable cross-section of what can be done. This will someday be used to gage the advantages of industry-wide adoption of a parallel system.

AMONG THE SUPPLIERS

William E. Ireland, formerly vice president-sales of **International B. F. Goodrich Co.,** has been named vice president-general manager of the Tire Sales Division of B. F. Goodrich Co. of Canada, Ltd., Kitchener, Ontario . . . **J. Blaine Eustice** has resigned as project engineer with the **Aircraft Engineering and Maintenance Co.,** to open a sales and service representation company. The organization, known as **LESCO,** will maintain offices at 2166 Market St., San Francisco.

Foote Bros. Gear and Machine Corp., Chicago, Ill., has appointed **R. W. Johnson** as director of sales of the Industrial Gear Division . . . **Edo Corp.,** College Point, N. Y., has elected **Archibald M. Brown, Jr.,** vice president-sales, and **William R. Ryan,** vice president-engineering, filling the two positions left vacant with the recent retirement of **George Post** and **B. V. Korvin-Kroukovsky** . . . **William Hatton** and **Frank B. Powers** have been elected vice presidents of the **Federal Telephone and Radio Corp.,** Clifton, N. J.

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EL INTERCONTINENTAL—The popular tourist flight that saves you 25% on air fares between Dallas, Houston, Havana, Panama, Lima and Buenos Aires.

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'Solid Loading' Ups Cargo Space 30% for American

The capacity of American Airlines' Douglas DC-4's has been effectively increased by over 30%, making possible bigger loads and greater profits. This has been the result of a decision to use solid loading in AA's cargo operations, a practice which had previously put the irregular operators at a vantage point.

During the first years of its full-scale cargo operations, American Airlines found itself at a disadvantage in carrying high-volume, low-weight loads. Its policy of leaving an aisle the length of the fuselage was accomplished with a loss in capacity and at high cost in loading time.

The aisle was retained in these cargo operations to permit the crew ready access to any part of the cargo load. This was advantageous in checking the cargo for possible shifting and mandatory to permit detection and extinguishment of possible cargo fires.

By reworking the airplane as shown in the accompanying photographs, American has provided improved fire detection and extinguishing in the main cargo compartment and brought about the economy of space possible with solid loading. The many flights which formerly departed with less than capacity weight loads because of volume limitations, are now departing with higher payloads which provide proportionately higher profits.

Smoke Detectors

To provide adequate fire detection equipment, American installed new, instrument-panel-mounted visual smoke detectors (see cut) made by CO-TWO Fire Equipment Co.

These detectors, two instruments, are little more than glass tubes connected by plumbing to the critical areas. As can be seen, each instrument provides for two compartments and as used in the AA ships one instrument covers the fore and aft sections of the cabin while the other is connected with the forward baggage compartment and cabin heater.

Air is continuously drawn from the compartment through the plumbing into the instrument by a vacuum system. The pilot can select the engine vacuum pumps or an external clam shell for his vacuum source. While the air is clear the pilot receives no signal. If smoke exists in the air, the light from a concealed lamp in the CO-TWO instrument is reflected, giving the pilot a warning signal.

Six 15-pound CO_2 cylinders mounted in the nose-wheel well, are interconnected to controls on the pilot's panel and to each of the compartments. The selective arrangement of the controls makes it possible for the pilot to discharge either set of three bottles each into any compartment.

To provide additional protection against fire spreading throughout the cabin, American has designed a fireproof curtain (see cut) which is used to divide the main cabin into two separate sections. Each of these areas has its own detection and extinguishing lines.

SMOKE DETECTOR instruments are shown here on the pilots panel. Unless smoke is drawn through the instrument from the compartment no signal exists. The handle at the left is the selector controlling the source of vacuum used in sampling the compartment air.

PRACTICAL ASPECTS of solid loading are well illustrated here. Note the webbing in active use at the forward end of the cabin. Immediately aft of the webbing at the ceiling level is the fireproof curtain which is lowered to compartmentize the cabin.

THIS VIEW along the cabin ceiling shows the small fire extinguisher lines on either side of the heater duct and the smoke detector sampling box. Actually AA uses the plumbing originally associated with the electronic smoke detectors.

Extra Section

By William D. Perreault

HOW MUCH fuel are the commercial airlines using in comparison with the total crude production? In recent issue of *Esso Air World*, A. R. Ogston reports that at present the airlines consume less than 1% of total crude production. He adds that the world's production of crude oil, excluding Russia, is approaching 9,000,000 barrels a day. Ogston doubts, even with the rapid expansion of air services and the switch to high-consumption turbine-powered aircraft, that this figure would ever exceed 3 or 4%. This is equivalent, he says, of 360,000 barrels or more than 15 million U. S. gallons per day.

•

During the IATA Technical Conference at Asbury Park, N. J., Boeing's chief sales engineer, Ken Gordon, noted that his company had investigated the possibilities of in-flight refueling and determined that it could not be economically justified for commercial operations. Gordon noted that this study included refueling over the airport immediately following take-off, refueling en route at some convenient point or refueling over the destination.

•

Starch jellies, little more than the common gum drops with which we are all familiar, are the principal ingredient in the new type Air Force emergency food rations. Also included with eight half-inch jellies are two lumps of sugar and an envelope containing powdered tea or coffee. This is enough for one man for one day, it is reported.

•

We thought that the only place where automatic fire extinguishing appeared to be the goal was in the airplane. Recently American-LaFrance Foamite Corp. announced a new and completely automatic extinguishing system which automatically sounds the alarm, stops motors, closes windows, shuts off fans, closes doors and puts out the fire. This would appear to be an interesting configuration for use in the paint storage room, power supply room and in areas where volatile fluids are stored.

•

The Boeing Stratocruisers have now been in service over a year. In the first eleven months the new double-decked transports carried more than 160,000 revenue passengers and flew more than nine million airplane miles. During the first year they logged about 49,278 hours in the air. For the record, this is the order in which the airlines started service with the 55 Stratocruisers, as reported in the Boeing house organ: April 1, 1949, Pan American started San Francisco-Honolulu service; August 1, Northwest Airlines inaugurated service between Chicago and Minneapolis-St. Paul followed by transcontinental service on Sept. 1; August 17, American Overseas started New York-London flights with the Stratocruiser; December 6, BOAC scheduled London-New York service and on January 15, 1950, United Air Lines started San Francisco-Hawaii service.

•

Everyone in the aviation business is generally familar with Air Associates but few seem clear as to the full scope of its operation, how much it does in the way of manufacturing, its distributor activities, etc. Recently Air Associates has published a 24-page illustrated report on the company's activities which should prove of general interest. The well illustrated, informative piece is titled "This is Air Associates." Address: Teterboro, N. J.

•

Recently Helicopter Air Service's chief pilot, Wes Moore, noticed a non-scheduled Curtiss C-46 at the end of a Chicago runway awaiting clearance to takeoff but with the locks still on the control surfaces. From the helicopter Moore contacted the tower and warned the C-46 pilot in time to prevent the takeoff. The incident raises anew the age-old problem of preventing such omissions. While ground crews may be very efficient, the record shows many cases of this nature. A number of airlines have used weights connected to the control blocks to effectively eliminate this danger. It does stress the need for full control movements during pre-takeoff checks since loose fitting locks sometimes do allow partial movement and bring on a false sense of security.

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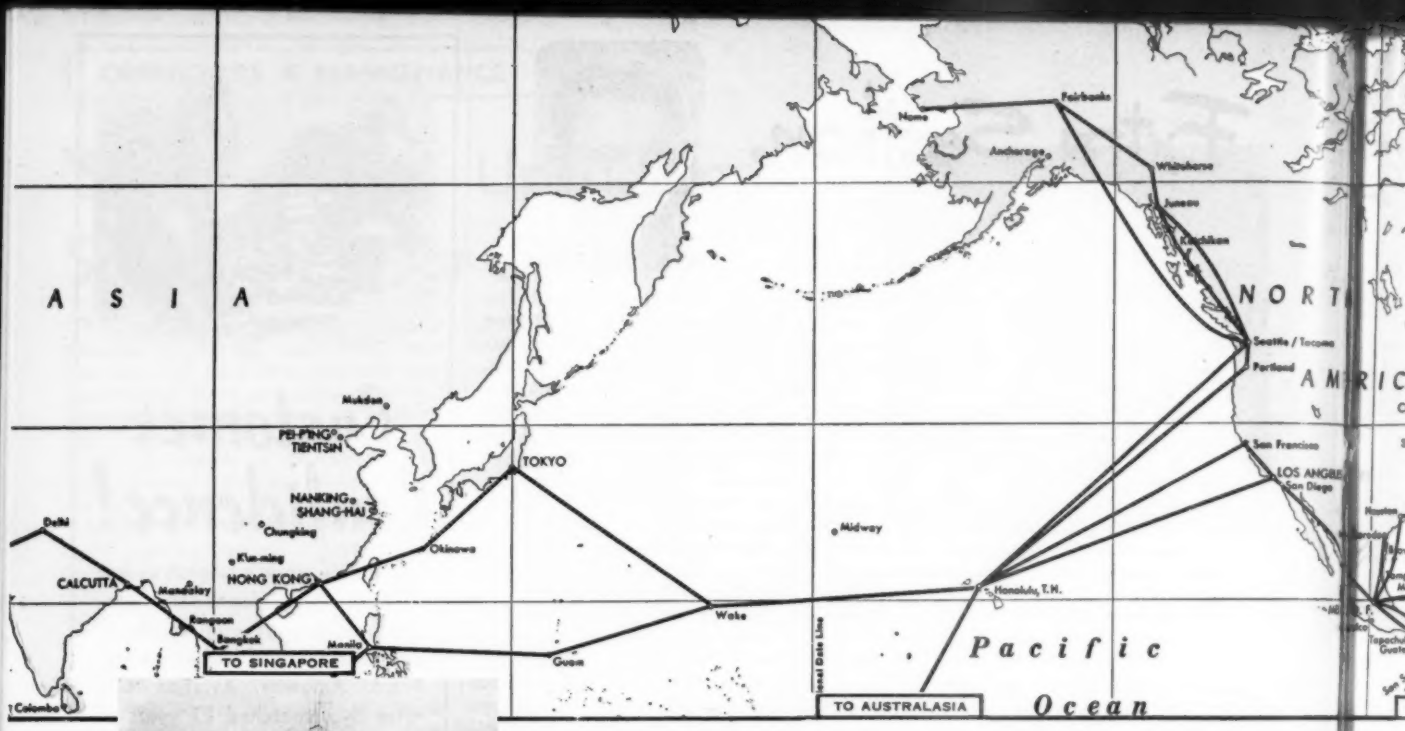

Site of Pan American's Collins 3000A VHF transmitting and receiving installation atop Mount Zugspitze.

Pan Americ

. . . equipment by COLLINS

When America
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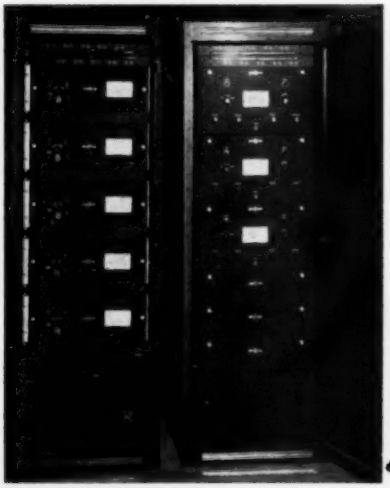
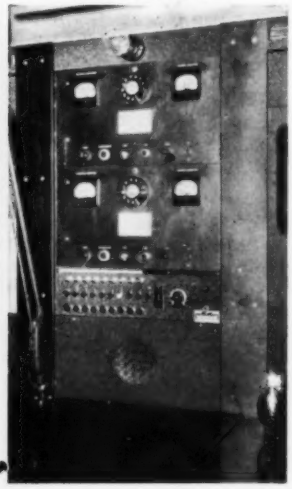
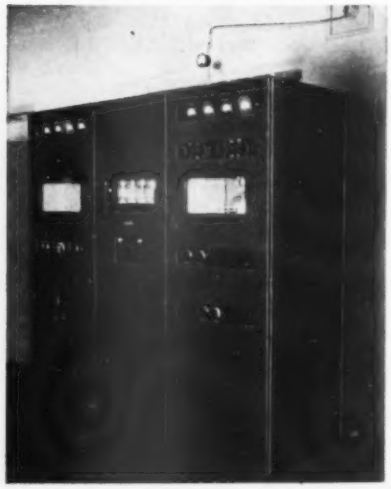
Below, left, for New Delhi, India, five Collins 51N-2 receivers tuned respectively to 3, 5, 8, 11, and 16 megacycles. Below, right, three Collins 51N-3 receivers and power supplies, for Munich, Germany, to operate on 4, 8, and 11 megacycles.

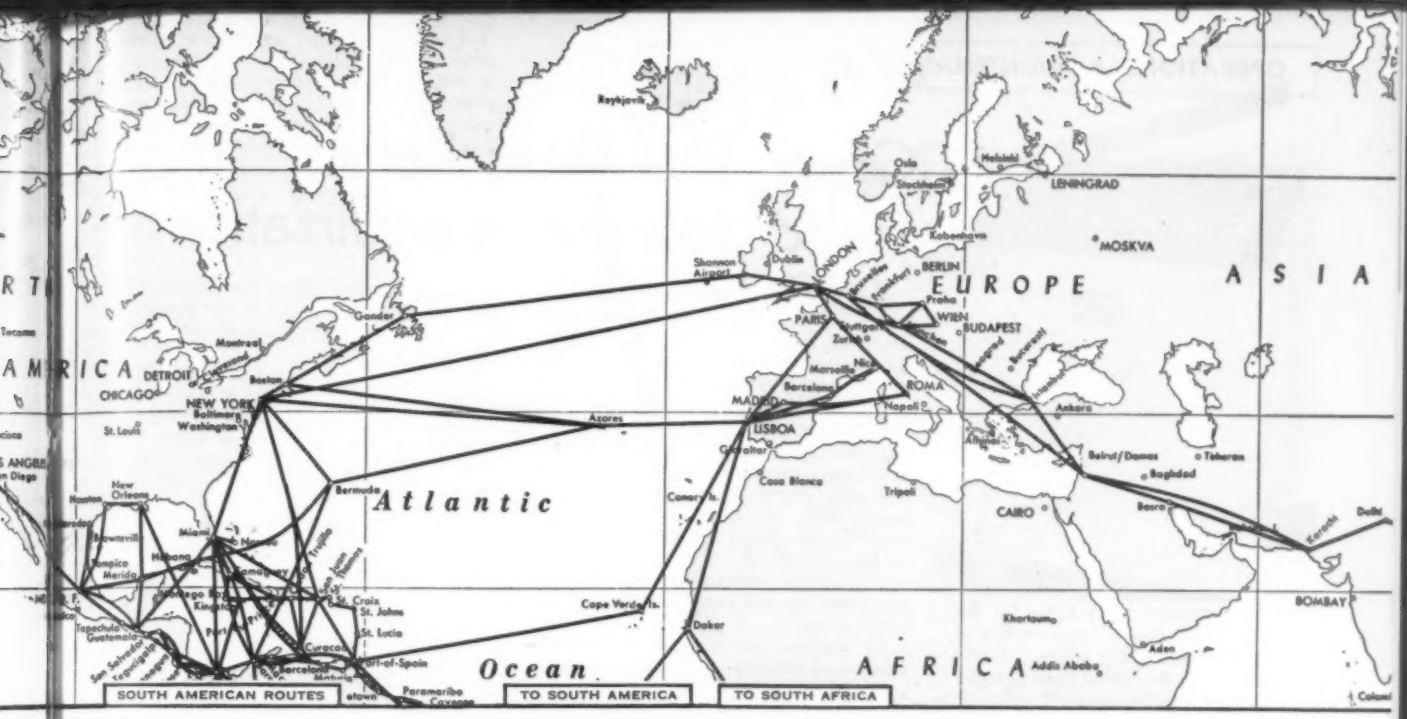


Collins Autotune* control position at Lisbon.



Collins 231D 3.5/5 kilowatt Autotune* transmitter installed at Lisbon.





...ican pioneers radiotelephone network

When ... American World Airways opened a route into the Middle ... st in ... all en route plane-ground communications had to be ...forme... radiotelegraph — the dot-dash system. A radiotelephone ...work, ... that used on the United States airways, did not exist ...erseas.

Today, ...ough the initiative of Pan American, messages can be ...hange... mediately by radiotelephone between Clipper pilots and ...ound ... operators over every foot of the Clipper routes from New ...rk to ..., Iraq, and from New Delhi, India, eastward round the ...rld to ... Francisco.

To ac...plish this ... extensive pioneering job, Pan American has ...ested ... years of ... work and a large sum of money. This airline ...s nego... permis...ion for radio stations with foreign governments, ...d has ...ed thes... stations at a number of points in Europe and ...a. Pil... and grou...d personnel have been trained for the new ...ration... the C...pers' radio installations have been modified ...n radi...graph t... ...adiotelephone.

The m... radio un... chosen by Pan American World Airways for ...s purp... and for ... Caribbean area, are Collins high frequency ...und s... and air...orne transmitters and receivers. Included are Collins 231D 3.5/5 kilowatt Autotune® transmitters, 16F 300/500 watt Autotune® transmitters and 51N receivers on the ground, and 18S transmitter-receivers in the air.

To complete the modernization of its ROUND THE WORLD system, Pan American has installed Collins 231D and 16F transmitters, and 51N receivers, in route stations at Santa Maria, Lisbon, London, Munich, Vienna, New Delhi, Calcutta, Bangkok, Manila, Honolulu, Los Angeles, San Francisco and Seattle; a 16F transmitter and 51N receivers at Vienna; a 16F transmitter at Damascus; and 51N receivers at Rome.

Additionally, a great improvement in ground radiotelephone service was made at Munich. There, VHF communications were relocated from the airport to the top of 10,000-foot Mount Zugspitze in the Bavarian Alps, whence a Collins 3000A very high frequency transmitting and receiving installation increases the effective operating radius from 50 to 250 miles, covering an area from Luxemburg to Milan, Italy.

This pioneering by Pan American World Airways is in the best tradition of American free enterprise. Collins is proud to have been chosen to play a part.

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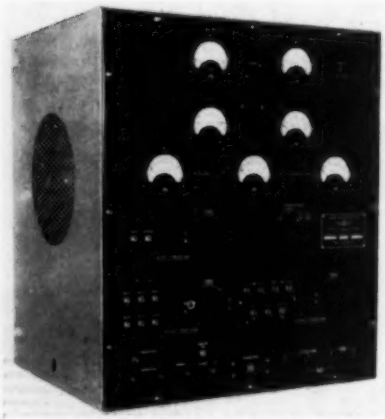
nance men have often removed car- |

Greer Test Units Point Trend Toward Specialization

GREER'S POWER UNIT tester for the Boeing Stratocruiser is representative of the trend in tester design. Proper operation of the circuit being tested is flashed on the panel by lights.

THIS PORTABLE CARBURETOR test unit offers a combination electrical and fuel flow meter arrangement of considerable promise.



AIRCRAFT INVERTER test machine offers means of testing power sources under full or partial load with automatic protection against overheating.

With electrical and electronic systems bearing an increasingly large share of aircraft control and operational loads, reliable testing equipment for the related circuits becomes vastly important.

This need for simple effective testing equipment is emphasized by the shortage of trained electrical specialists and electronic technicians. The availability of simple testing equipment brings about a tangible increase in the output of available specialists and qualifies certain technicians for work that would otherwise be beyond their scope.

In the earliest postwar days there was a tendency for each aircraft manufacturer to build his own test equipment for the commercial and military market. More recently, with the advent of the ground equipment design specialists, the aircraft manufacturers have shown a tendency to rely on firms such as Greer Hydraulics, Inc., to provide the necessary testing equipment, directly or indirectly used in servicing and testing their aircraft.

Touring a typical overhaul base, such as TWA's in Kansas City, one sees whole banks of Greer Hydraulics testing equipment in use: fuel pump testing stands, hydraulic pump testers, vacuum test bench, oil regulator test stands, the intricate fuel injection testers, etc.

One of the interesting developments in this field is the wide-spread expansion of Greer into the manufacture of test equipment for electronic and electrical circuits and into electronic test equipment for fluid systems. Some of these test machines are the Boeing electrical test system for the Stratocruiser, the portable carburetor test unit, propeller synchronizer test machine, CV-240 air conditioning and pressurization test analyzer, aircraft inverter test machine, aircraft alternator load bank, and circuit breaker tester.

Boeing Stratocruiser

Typical of this expansion, to meet the challenge introduced by increasing electrical complexity, was the introduction of the Boeing Electrical Test System by Greer.

This is a compact, four-box unit which can be used to check any electrical installation on the Boeing Stratocruiser. Its usefulness is representative of the trend in tester design: wherever possible the proper operation of the circuit being tested is flashed on the panel by means of lights. It does not require, for general usage, skilled interpretation of multiple signals.

The power package test unit, the major assembly, provides a means of checking any circuit which has connections at the engine fire wall. It makes possible resistance, continuity and dynamic tests of all circuits associated with the powerplant. Whether checking the operation of the turbo boost amplifier, or the simple carburetor air temperature circuit, the operator need only operate switches and watch the control panel for signal lights.

Simplifies Testing

The main cabin control shield test unit makes it possible to test and calibrate the cockpit temperature control circuit as required in service. With this unit resistance checks, calibration and operational tests are reduced to simple operations. The cockpit control shield test unit and the lounge and cargo control shield test assemblies serve similar applications in the intricate circuits associated with the temperature control in these areas.

The widespread use of circuit breakers in place of fuses in postwar airplanes, and their mandatory introduction into certain circuits of older airplanes, stressed the need for reliable testing equipment. Unlike the electrical circuit fuse, a faulty circuit breaker can not be detected by visual checks nor by ordinary electrical tests.

Recognizing this need Greer built an aircraft circuit breaker tester, model CBT-1, which will load test circuit breakers while they are still mounted in the aircraft's junction box.

Again, simple controls and large dials make it relatively simple for the technician to determine proper operation and performance of the circuit protection. The tester provides a reading on input voltage, circuit current and elapsed time of tests. The operator can vary current flow from zero to 105 amperes in one-ampere increments.

Carburetor Flow

A combination electrical and flow meter arrangement of considerable promise has been introduced in Greer's portable carburetor test unit. Ever since the introduction of the pressure type carburetor, mainte-

nance men have often removed carburetors for test when the trouble was in some other unit. Inability to accurately check carburetor fuel flow without removing the unit has many times prevented on-time departures.

The portable aircraft carburetor test unit makes it possible to flow test a carburetor in less than one-half hour while the carburetor is still installed in the airplane without disturbing actual operating conditions and with faithful reproduction of engine vibration and temperatures.

As can be seen in the photo, the portable tester uses a low pressure metering suction gage with a range of 0-50 inches of water in .2 inch graduations. A fuel flow autosyn transmitter and indicator with ranges of 100-1,000 pounds per hour is used to provide flow readings. A conversion chart on the face of the panel makes it possible to convert the degree reading on the flow meter dial to pounds of flow.

Test Analyzer

Greer's test analyzer for the air conditioning and pressurization equipment in the Convair Liner is another achievement in the field of simplified equipment for ground testing of aircraft electrical circuits. This unit was designed by Convair and is being built by Greer. It makes it possible for one operator to test the cabin heat and pressurization system circuits.

Operationally the test analyzer has three connectors, a five-position selector switch, a two-scale socket and suitable warning lights. Two of the connectors are keyed to specific items of equipment during unit tests, the third is a ground cable. Prominent labeling of all the lights, switches and controls makes it a simple matter for the technician to become proficient in use of the test analyzer.

Inverter Tester

Greer's aircraft inverter test machine provides a means of testing these power sources under full or partial load with automatic protection against overheating. This table-mounted unit makes it possible to check the operation of the starting and transfer relay, mechanical performance of the inverter, voltage and frequency regulator operation and inverter output phase.

These units, as described above, are a small cross-section of the growing line of aircraft equipment test machines which are now being engineered and produced at Greer's plant in Brooklyn, New York. Even at this early date there are indications that their success will parallel that of the older line of Greer hydraulic, vacuum, fuel and ignition testers now serving commercial and military operators.

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TECHNICAL LITERATURE

Chemicals Guide: The Aviation Chemicals Division, Fine Organics, Inc., 211 East 19th St., New York 3, N. Y., has available a guide to chemicals used in airline operations, maintenance and overhaul. A chart type presentation providing a useful working tool in the shop.

Steam Cleaners: The DuBois Co., Cincinnati 3, Ohio, has released a nine-page booklet on the operation and maintenance of steam cleaners.

Dielectric Booklet: Dow Corning Corp., Midland, Mich., has available a 16-page booklet describing and illustrating some of the aircraft and electronic applications of Dow Corning DC4. This is a waterproofing and lubricating dielectric used in ignition systems, control circuits, etc.

Nut Retainers: Tinnerman Products, Inc., 2036 Fulton Road, Cleveland, Ohio, is offering an eight-page illustrated brochure describing 49 standard sizes of the Speed Grip Nut Retainers. Includes description of Speed Grip principle and specifications of each stock size, screw size, panel range and all dimensions.

Rivnut Data Book: The B. F. Goodrich Co., Akron, Ohio is distributing a new 20-page Rivnut Data book for designers and engineers. Includes typical applications, advice on selecting Rivnuts, proper installations, strength requirements, head type, torque, seal and grip. Requests should be on company letterhead.

Stainless Steel: Armco Steel Corp., Middletown, Ohio, has available a 12-page illustrated booklet titled "Stainless Steel for Heat Resistance." Discusses properties of stainless steel and outlines proper grades for parts subjected to heat.

Foam Extinguishers: Pyrene Manufacturing Co., 560 Belmont Ave., Newark 8, N. J., is distributing a 20-page illustrated booklet entitled "Air Foam for Airports." Describes different types of portable, mobile and stationary air foam equipment, high expansion and low expansion foam compounds. Considerable advice on selection of equipment.

Reprint: American Non-Gran Bronze Co., Berwyn, Pa., has available a two-color reprint of an article entitled "Making and Inspecting Bronze Aircraft Engine Parts."

Compressed Air: The Compressed Air and Gas Institute, 1410 Terminal Tower, Cleveland, Ohio, has available an 18-page basic reference booklet on compressed air and gas power. A non-technical review of the application of compressed air and gas theory to actual machines and uses. Includes use of compressed air, types of compressors and theory of compressed air.

Patent Data: Invention, Inc., Munsey Building, Washington 4, D. C., has published a folder entitled "Telling the Age of a U. S. Patent." Lists the number of each patent, reissue, design, and trade mark granted at the beginning of each year from 1836 to date. Requests should be on business letterhead.

Metallurgy Chart: Templi Corp., 132 West 22nd St., New York 11, N. Y., has available a wall chart titled "Basic Guide to Ferrous Metallurgy." Gives the working characteristics of steels in temperatures from 300° F. to 2,900°. Includes 23 fundamental metallurgical terms defined and explained. Requests should be on business letterhead.

Subdrainage: Armco Drainage & Metal Products, Inc., Middletown, Ohio, has available a four-page illustrated folder describing how Armco Subdrainage Systems work toward permanent solution to ground water problems. Includes reference to airport maintenance aspects.

Spec Sheets: Gould Storage Battery Corp., Trenton 7, N. J., has available a set of seven new aircraft battery specification sheets covering battery compartments, battery types, installation and maintenance instructions, etc. Includes dimensions, construction details, weight and similar data. Punched for three-ring notebook use.

PLASTIC TUBING: U. S. Stoneware, Akron 9, Ohio, has published a 24-page illustrated catalog titled "Tygon Flexible Plastic Tubing." Tygon is a trade name for a group of modified vinyl plastic materials and the booklet discusses the properties of this material and uses of standard Tygon formulations in extruded form.

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International

		March	April
American	2 eng. pass.	:36	...
	4 eng. pass.	3:56	4:02
	cargo	....	4:25
AOA	2 eng. pass.	1:16	1:32
	4 eng. pass.	3:06	3:10
Braniff	4 eng. pass.	6:27	6:31
C & S	4 eng. pass.	8:49	8:56
Colonial	4 eng. pass.	5:40	6:10
EAL	4 eng. pass.	9:23	8:56
NAL	4 eng. pass.	9:01	8:48
	cargo	....	2:33
NWA	4 eng. pass.	7:39	7:45
	cargo	....	9:25
Panagra	2 eng. pass.	4:14	3:31
	4 eng. pass.	5:30	5:34
	cargo	3:34	1:15
PAA			
Lat. Am.	2 eng. pass.	3:28	3:41
	4 eng. pass.	7:07	7:24
	cargo	3:34	3:18
Atlantic	4 eng. pass.	4:37	4:56
	cargo	5:39	4:40
Pacific	4 eng. pass.	5:02	5:13
Alaska	4 eng. pass.	6:51	6:40
	cargo	6:30	6:31
TWA	4 eng. pass.	6:50	6:20
	cargo	4:52	5:37
UAL	4 eng. pass.	3:37	3:36

Feederlines

AAA	DC-3	5:14	5:42
Bonanza	DC-3	4:12	3:48
Central	Beech A-35	3:27	3:27
Challenger	DC-3	5:36	5:40
Empire	DC-3	5:17	5:15
Mid-West	Cessna 190	3:53	4:60
Monarch	DC-3	7:12	6:04
Piedmont	DC-3	6:25	7:13
Pioneer	DC-3	7:29	7:33
Robinson	DC-3	5:57	5:57
Southern	DC-3	7:14	7:37
Southwest	DC-3	5:25	5:23
Trans-Texas	DC-3	6:28	5:39
Turner	DC-3	3:24	3:26
	Bonanza	3:47	3:46
West Coast	DC-3	4:04	4:05
Wiggins	Cessna T-50	2:08	2:18
Wis. Central	Lockheed 10A	7:13	7:12

WORLD'S FIRST

Turbo-Prop

ATTACK BOMBER

Douglas A2D Skyshark

Most powerful airplane of its size and type ever developed, the new Navy A2D-*Skyshark* is designed to fill the military need for all 'round tactical ground support and sea-air attack.

Powered by Allison's T-40 turbo-prop engine, driving two counter-rotating propellers, the A2D gives performance comparable to that of many operational jet fighters. The A2D can carry a greater payload than any known jet bomber or fighter for the same expenditure of fuel.

Offensive punch of the new plane is delivered by a variety of rockets, bombs, aerial torpedoes, or other weapons carried on external wing racks. Striking power is ideally adapted to air support of amphibious troops as well as to attacking targets at sea.

Thus the A2D becomes the proud successor to the versatile Douglas AD-*Skyraider* series of attack aircraft.

EL SEGUNDO PLANT OF DOUGLAS AIRCRAFT COMPANY, INC.

DEPEND ON DOUGLAS

30TH ANNIVERSARY YEAR

Air Line Filter

Keller Tool Co., Grand Haven, Mich., is marketing an air line filter for use in the supply lines of air-powered tools. The filter element, in two-piece aluminum housing, is of porous sintered bronze, and filters out all dust, dirt, grit or scale down to .001 inch. A series of baffles in the bottom of the filter trap condensation and moisture in a

sump from which the accumulated waste can be removed through a drain cock. Rated capacity is 40 cubic feet per minute with a pressure drop of one pound per square inch. Weight is 1½ pounds; overall size, 3¾ inches by 2⅝ inches by 5⅛ inches.

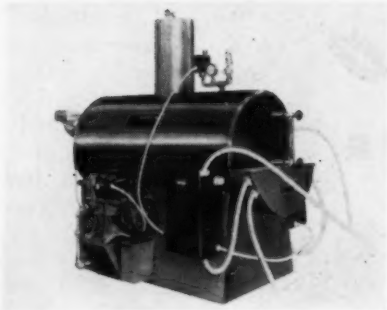
Portable Step

Honeyman Mfg. Co., 2043 N. Columbia Blvd., Portland 3, Ore., is manufacturing a portable step unit for passenger boarding and shop work. Constructed of aluminum alloy tubing and angle steel, the Rol-Away step is rubber-tired. Rubber feet on front legs give rigid stability and safety. All welded construction.

Tempilsticks

Tempil Corp., 132 West 22nd St., New York 11, N. Y., is marketing Tempilstik, Tempil Pellets and Tempilaq, simple methods of making accurate determination of working temperatures. These de-

vices are available in a wide series of temperature ranges with the various types providing versatility of application. In use the Tempilstik is used to mark the part which is to be checked. When the temperature of that part reaches the melting point of the marking, the exact temperature, within plus or minus 1%, is known. The tempilstik is shown here. A brochure describing available temperatures and prices is available.



Steam Boiler

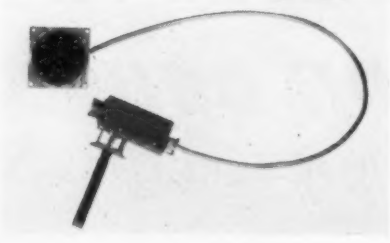
Siebring Mfg. Co., George, Iowa, has introduced a new stationary, automatic, electric steam boiler for producing small or moderate amounts of steam up to full 90 pounds pressure. Used for cleaning operations, the boiler will handle two nozzles. Made in accordance with ASME specifications for working pressures up to 150 pounds, the unit will stand a 300-cold water test. This automatic boiler is available in 40-, 60- and 90-gallon sizes. Each element of 10 kw develops one boiler hp and boiler hp depends on the number of elements ordered. Sizes 1/10 to 10 horsepower are available.

Finger-Tip Wrench

Skyproducts, Ottsville, Pa., is marketing the Touch 'N' Grip finger-tip wrench for use in simple assembly operations where it is necessary to hold nuts stationary during installation in out-of-the-way and out-of sight places. Formed from nickel-plated steel, Touch 'N' Grip wrenches are available in sets of four to fit ¼ in., 5/16 in., 11/32 in. and 3/8-inch hex nuts. They are adjustable to fit any size finger.

Duct Thermostat

Barber-Colman Co., Rockford, Ill., has designed a duct thermostat equipped with a flexible cable for remote control of aircraft heaters. The thermal sensing element maintains a constant control point with variations in duct air velocity. Standoff flange mounting eliminates variations in calibration with changes in ambient air temperature. Maximum thermostat operating tem-



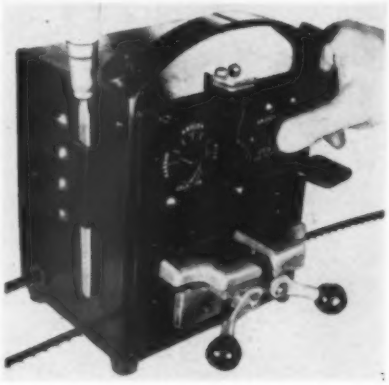
perature is 450° F; maximum range is 200° F. Standard control cable lengths are four and eight feet. Electrical components are explosion-proof.

Vinyl Tubing

Resin Industries, P. O. Box 1589, Santa Barbara, Calif., has developed a vinyl tubing for aircraft insulation which it claims to be fungus resistant. Unlike vinyls made to USAF specification minimums which only specify meeting electrical and physical minimums during fungus attack, the manufacturer states that this tubing eliminates fungus growth entirely. Known as Resinite EP-69, the new vinyl meets the USAF's specification 12047-A.

Portable Butt Welder

DoAll Co., Des Plaines, Ill. is marketing a portable automatic saw blade welder featuring on-the-spot welding and annealing of saw blades up to ½ inch in width. The DBW No. 10 is housed in a steel case with all controls



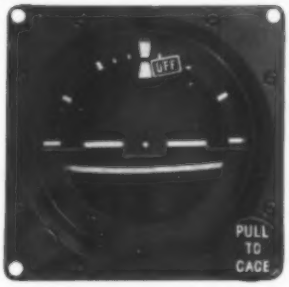
marked to provide easy operation. A weld selector automatically provides correct spring tension to welding jaw for welding blade widths varying from 1/16 to ½ inch. A push button switch controls correct amount of heat for annealing operations and a thickness gage is provided to test proper blade thickness at the weld. It measures 7 x 8 x 10-¾ inches, is provided with a 6-foot rubber-covered cord and operates of any 110-or 220-volt, 50- or 60-cycle power.

Frequency Generator

Varo Mfg. Co., Garland, Tex., has introduced the Model 622B frequency generator which operates from 28 volts DC aircraft power and delivers a 15-volt sinusoidal voltage to a 1-megohm load. Its frequency is 400 cycles per second plus or minus 1/10% from minus 55° C to plus 110°. Manufacturer claims exceptional frequency stability over large ranges of temperature, altitude and input voltage. It is 3-1/16 inches high, 1-11/16 inches wide and 3⅜ inches long and weighs only 11 ounces. It is hermetically sealed.

New HORIZONS

...on 8 CARDINAL POINTS!



- NEW STANDARDS OF ACCURACY—in turns and all flight conditions.
- QUICK ERECTING—manually controlled.
- INSTANT READINESS—operable within 10 seconds.
- FLAG ALARM—monitors correct electrical operation.
- COMPLETE ATTITUDE FREEDOM—360° in pitch and bank.
- LOW POWER CONSUMPTION—under 8 VA; available for 26 V or 110 V operation.
- COMPLETELY SELF-CONTAINED—low weight and simplified installation.
- SIMPLIFIED CONSTRUCTION—maintenance costs are reduced to a minimum.

There's a new outlook on Horizons! The latest Eclipse-Pioneer Attitude Horizon Indicator is a brand new instrument that incorporates eight major features of utility, reliability and simplicity. From any attitude this Horizon will contribute to the efficiency of your operation. Check its features and you'll see why it's new, and how it has been engineered for you, your airplane and your flight.

Another example of the developments that have made Eclipse-Pioneer the leader in its field.

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'No Cash' Register Rings Up Savings

UNIQUE CASH REGISTER is used by Hawaiian Airlines for recording traffic transactions. (A) above indicates two rows of flight card serial number print keys used to print number of baggage pieces; (B) represents three rows of weight accumulating keys; (C) shows row of four destination designator keys, corresponding to four rows of pockets in rack in front of register; (D)—130 represents passenger weight in pounds, IV the destination designator key pressed; (E) flight coupon inserted, on which is printed passenger weight; (F) pocket in rear for lifted flight coupons, pocket in center for flight cards, pocket in front for reservation releases and accumulated weight slips.

. . . novel traffic handling system saves $90,000 for Hawaiian Airlines

HAWAIIAN AIRLINES ticket offices have cash registers that are different.

No money goes into these registers; in fact, they do not even have cash drawers.

But in an indirect way these cash registers do add to Hawaiian's net income by saving the company considerable money in handling passengers, baggage and manifests. Coupled with other innovations, they enabled the airline to save $90,000 in station operating costs last year over the year before. That's a tidy saving for a small airline.

One department in which the company saw an opportunity to introduce production methods that would result in worthwhile savings was in the handling of passengers, for its planes carried over 300,000 revenue passengers last year. This was nearly as many passengers as were carried by such domestic trunklines as Chicago and Southern, Western, Northeast and Mid-Continent.

In Hawaiian Airlines, the station department is responsible for all airport station and ramp activities, including the handling of passengers, baggage, mail and express.

Two men in that department—Osbuern McCraw, superintendent of stations, and W. R. Faris, Honolulu station manager and assistant superintendent of stations—tackled the problem of how to handle passengers and baggage in less time and at less expense. They came up with a set of procedures, a key feature of which was the use of cash register machines to record certain transactions.

These machines, manufactured by the National Cash Register Co., are standard models with slight modifications, such as elimination of the cash drawers and some changes in the printing wheels. Two models are used, one for passenger check-in only and the other having an extra row of keys for baggage check-in or for combination passenger and baggage check-in.

As can be seen in the photo (lower front), the passenger check-in register is provided with a rack immediately in front of the machine, this rack having four sets of three pockets each. Each set of pockets is numbered to correspond to keys on the machine representing the several destination points. The row of pockets next to the machine serves to hold the flight coupons removed from the passengers' tickets. The next row holds the flight cards, which are numbered serially and are of a distinctive color for each destination. The pockets immediately behind the glass front hold reservation releases and weight coupons.

How It Works

Here's how the system works:

• **Prior to check-in time for a given flight,** the clerk places a set of flight cards, arranged in numerical sequence from front to back, in the proper pocket of the rack. He can tell by referring to the reservation release how many passengers are to board the airplane, and when there are less than 24 passengers he turns up the flight card with the serial number corresponding to the total number of passengers as an indicator that all passengers have been checked in when that card is given out.

(Referring again to the photograph, the Hilo flight "S" in the "II" pocket will have 22 passengers, while the other flights will have 24 passengers —24 being the total number of seats in Hawaiian's DC-3's.)

The flight cards are then handed out in sequence, starting with serial

number 1, in exchange for ticket coupons turned in by the passengers.

• **When the passenger appears at the check-in window** for any one of the flights, he gives his ticket to the clerk. The latter removes the flight coupon from the ticket, inserts it in the slot at the top of the register, punches the keys on the left side to indicate the card number to be given the passenger, presses the proper keys in the three right-hand rows to indicate the weight of the passenger, presses the proper destination key and then presses the actuating bar.

During this process, which is carried out with the right hand, the clerk picks out of the rack the next flight card for that particular trip and gives it to the passenger. This finishes the procedure so far as the passenger is concerned.

• **The cash register prints on the ticket** (1) the date, (2) the flight card number, (3) the passenger's weight and (4) the destination designator. The clerk then takes the flight coupon and inserts it in the pocket immediately behind the flight card pocket in such a way that, reading from front to back, the flight coupons will run in numerical order corresponding to the flight cards which have been given the passengers.

Speedy Handling

As noted previously, the passenger's name is on the flight coupon, and thus by reference to the flight card number, which is also printed on the coupon, the passenger can be identified at any time so far as ticket and baggage information are concerned.

A ramp agent desiring to know the current status of the passenger load on any given flight can obtain this immediately by a call to the check-in clerk, and he is automatically given the total weight by the clerk when all passengers have checked in for a given flight.

To obtain the weight of any particular flight, the clerk merely shifts the lever shown at the bottom right-hand side of the key panel of the register, pushes the identifier key for the particular destination, and operates the actuating bar. A slip with the weight printed on it will then be ejected from the slot at the upper right-hand corner of the machine.

This weight-accumulating feature, which increases accuracy and saves many hours at a critical period of station operations, is an important one. Besides relieving the clerk of much paper work, it enables him to check in passengers for any one of four flights without reference to the order in which the passengers present themselves.

An idea of the speed with which passengers can be processed is gained from the experience of Hawaiian Airlines' Honolulu station, where it is a common occurrence for one clerk to process up to 96 passengers in an hour and as many as 850 passengers in a 10-hour day.

Furthermore, elimination of the necessity on the part of the clerk of remembering details concerning each transaction, even for a short period of time, and of laboriously writing out these details, eases the task of serving the public courteously and efficiently while carrying out an otherwise technical procedure.

The same type of cash register as is shown in the photograph, except with an additional row of keys placed in the space between the two left-hand rows and the first group of keys on the right side, is used to check-in baggage at the Honolulu and Maui stations, and is used to check-in both passenger and baggage at all other stations.

At those stations where a maximum of two flights are processed simultaneously, a combination register is used; at busier stations, such as Honolulu and Maui, the company has found it desirable to use additional machines of the same model rather than to purchase a specially-built machine which would take care of a larger number of simultaneous flights.

Ford Studebaker, vice president-operations and development, doubts that Hawaiian's system could be used profitably by other air carriers, at least not without some modifications and without study and analysis of the particular carrier's individual problems.

But for the purpose for which they were designed—to solve certain problems peculiar to airline operations in Hawaii—the cash registers and the check-in procedures built around them are both economical and efficient.

Italian Line Starts Atlantic Service

A foreign-flag airline with a good record of profitable operations made its debut on the North Atlantic route July 4.

This newest competitor for trans-Atlantic traffic is Linee Aeree Italiana, Trans World Airlines' affiliate, which is offering an initial service of one round-trip flight weekly between Rome and New York via Dublin, Gander and Boston, using DC-6 equipment. It is expected the frequency will be increased to two round-trips weekly beginning about August 1.

Leasing DC-6's

LAI was issued a foreign air carrier permit by the Civil Aeronautics Board on June 16 and shortly thereafter announced an agreement whereby FAMA, the Argentine airline, would lease three DC-6 aircraft to the Douglas Aircraft Co., which in turn would lease them to LAI so as to enable the latter carrier to advance the start of its transatlantic service.

Delivery schedule on the three DC-6's the Italian line has on order is as follows: first plane, August 25; second, September 13; third, September 30.

LAI, which started operations four years ago last month, was organized and is being operated as nearly like a United States carrier as is possible in a foreign country. TWA holds a 40% interest, the Italian government owns 40%, and the remaining 20% is

Air-Bus Tie-Up—First freight transfer from bus to air is shown at Logan International Airport, Boston, following conclusion of an interline traffic agreement between The Flying Tiger Line and New England Greyhound Lines. Greyhounds acts as agent for FTL in some 50 New England cities, both receiving and delivering airfreight shipments. Bus-air connections are made at Boston and Hartford.

held by private investors in Italy.

The line owns 17 Douglas C-47's, which it uses on its domestic and European routes, and will use the DC-6's exclusively on its North Atlantic route. Conversions of the C-47's were performed in Italy by Italian labor and are said to compare favorably with the DC-3's used by scheduled U. S. carriers in looks, comfort and performance.

Mazzarrini

Innovation in Italy

Crews consist of a pilot (commander), co-pilot, radio operator and hostess, the latter being a popular innovation in Italian civil aviation. The hostesses, incidentally, must be able to speak Italian, French and English. The pilots are all veterans, having formerly flown with the LATI and ALA LITTORIA companies, only existing Italian airlines prior to the war. All crew members, as well as station managers and ground personnel, are smartly uniformed.

LAI at present operates daily service to the following cities:

Fanning out from Rome, LAI at present operates daily service to the following domestic cities: Milan, Naples, Bari, Brindisi, Palermo, Catania and Cagliara (in Sardinia), and is about to inaugurate service to Florence, Genoa and Turin.

Its international services at present consist of regular flights to and from Tunis, Istanbul, Barcelona, Alexandria, Athens and Lydda. Through an interline agreement with TWA, traffic for all destinations on TWA's far-flung routes can originate at any point in Italy served or represented by LAI, and traffic from any TWA point can be sold to all destinations served by LAI.

Operated at a profit since its inception, LAI paid its stockholders a 5% dividend for the year 1948.

President of the Italian airline is aristocratic Prince Marcantonio Pacelli, nephew to His Holiness, Pope Pius XII, and general manager of the company is General Luigi Gallo, one of Italy's foremost flyers. Vice president of the line on behalf of TWA is Richard Mazzarrini, who helped organize TWA's international services to Rome in 1945 and while serving as TWA's regional director in that area assisted in the formation of LAI.

Mazzarrini in early 1949 was appointed assistant to Warren Lee Pierson, chairman of the board of TWA, but has remained in Rome, primarily because of TWA's association with Linee Aeree Italiana.

Over the Counter

Sales Promotion

DELTA AIR LINES is running a new easy-to-read series of ads, featuring jingles and cartoon illustrations. Most eye-catching is the air freight series with its illustrations of somewhat scantily-clad gals. The other ads feature catch lines like "No time for crying when baby goes flying," "Salesmen who fly meet more who buy," and "Get a Florida tan on the family plan."

All American Airways has put out a smart series of letters which are intended for posting on bulletin boards of larger airlines and for general distribution to these airlines' personnel to acquaint them with cities served by **AAA. Dave Miller, AAA's** sales director, says it's a tough job to get across to sales personnel of other airlines and to travel agents that his company serves a lot of important cities. However, we'll bet that anyone reading the letters will remember the stops. The one on Lancaster, Pa., for example, features humorous Pennsylvania Dutch sayings. It should be a productive program.

Hudson Motors' dealers in California and **American Airlines** have signed a deal that's going to be profitable for both. Hudson is increasing its new car sales. American gets a weekly DC-6 charter Los Angeles-Detroit, and the same from San Francisco, for 20 weeks, bringing in revenue of about $180,000. Here's how it works: A buyer pays regular California price for a Hudson. The dealer provides free air transportation for husband and wife to Detroit and contributes $45 toward expenses of driving the car from the Detroit factory back to California. This, of course, has been done before, but Hudson devised the idea of weekly departures and sending the buyers back in holiday party groups. Departures are on Sundays, enabling American to put its equipment back into service out of Detroit Monday, a heavy travel day.

Philippine Air Lines is distributing a booklet in Chinese, Spanish and English, describing its services . . . **Swissair** has issued a new Atlantic timetable plus a booklet of travel tips for those going to Switzerland. The company is featuring the slogan, "The Precision Route to Everywhere." **Caribbean Atlantic Airlines** has issued a simplified timetable . . . **United Air Lines'** 16 mm. sound and color motion picture, "High-Way to Hawaii," has won top award for travel films in international competition at the third annual film festival of the Cleveland Film Council. It was produced by Cate & McGlone, Los Angeles.

Air Coach

CAB has refused to allow **Loftleidir** (Icelandic Airlines) to file a New York-Reykjavik coach tariff on less than the statutory 30 days' notice. The company, which holds a foreign air carrier permit, proposes a DC-4 coach at one-way fare of $171.89, round-trip $309.40, about 40% under standard fare. CAB action doesn't represent disapproval of the proposal, but will delay inauguration at least a month . . . CAB approved coach tariffs of **Chicago and Southern** and **United,** and the companies were to start service early this month. C&S will fly DC-4's Chicago-St. Louis-Memphis-Jackson-New Orleans, while UAL extends its present coach service beyond Oakland/San Francisco to Portland and Seattle . . . After first refusing an extension, CAB reversed itself and allowed **Northwest** to continue its Chicago-Portland coach beyond June 30 to September 30. Supplemental evidence showed the coaches have been operating profitably, CAB said . . . **Capital Airlines** has added a non-stop Washington-Chicago coach, and is also continuing the Washington-Cleveland-Detroit-Chicago flight.

A proposed $59 transcontinental fare of **New England Air Express** was suspended by CAB as being too low. Another non-scheduled carrier, **Air Transport Associates,** had its proposed $52 fare from Seattle to Anchorage, Alaska, suspended for same reason.

New Services

AMERICAN Overseas Airlines has started operation of four round-trips weekly Hamburg-Berlin, with 64-passenger DC-4's. AOA also flies 11 trips weekly New York to Frankfurt and Berlin and two New York-Hamburg . . . With introduction of extra-fare New York-Buenos Aires Stratocruiser service, **Pan American World Airways** has revised Latin American schedules. DC-4 sleeperette planes have been re-routed to fly twice-weekly from New York non-stop to Curacao and thence to Caracas, Belem, Rio de Janeiro, Sao Paulo, Montevideo and Buenos Aires. San Juan and Port of Spain are eliminated as sleeperette stops. Three other weekly flights are operating New York-San Juan-Curacao-Caracas, and two others New York-Curacao-Caracas . . . **PAA** has started twice-weekly service to Beirut, Lebanon, which replaces Damascus, Syria, as the new terminal of PAA flights leaving New York for the Middle East on Sundays and Thursdays. Damascus continues to be served on trips leaving Tuesdays and Fridays . . . **British Overseas Airways Corp.** has started operation of a direct once-weekly London-New York service in addition to the seven round-trips weekly now flown. Direct service will be increased to twice weekly on August 1.

—ERIC BRAMLEY

12 Cities Top 300,000 Passenger Mark in '49

Twelve U. S. cities each enplaned more than 300,000 passengers on scheduled airlines in 1949, according to data assembled by the CAA's Office of Airports from statistics filed with CAB by the carriers.

Following are the cities, ranked according to number of passengers enplaned:

Community	Airlines	Passengers
New York	9	1,430,328
Chicago	12	1,168,294
Washington	9	698,699
Los Angeles	7	554,697
San Francisco	6	446,727
Boston	8	434,726
Dallas	6	413,076
Detroit	8	409,142
Newark	9	362,609
Atlanta	4	351,459
Cleveland	7	314,108
Pittsburgh	5	306,824

Figures are for the principal airport of the community and do not include surrounding fields. Los Angeles, for example, does not include Burbank, Long Beach or a number of others serving the area. New York does not include Newark or Teterboro but does include La Guardia and New York International. Detroit represents one figure for the area, with CAA stating that it was not possible to separate activity at the airports serving this community.

CAB CALENDAR

July 17—(Docket 3719 et al.) Oral argument before the Board in Pioneer Airlines Certificate Renewal Case. 10 a. m., Room 5042, Commerce Building, Washington, D. C.

July 17—(Docket 4198) Hearing on application of Linsas Aereas Costarricances, S.A. for foreign air carrier permit to operate between Miami and San Jose, C.R. Place and hour to be announced.

July 24—(Docket 3718 et al.) Hearing reconvened in Southwest Airways Certificate Renewal-United Air Lines Suspension Case. Place and hour to be announced. Examiner Paul N. Pfeiffer.

July 25—(Docket 3717 et al.) Oral argument before the Board in The Cuba-Florida Air Carrier Permit Case. 10 a. m., Room 5042, Commerce Building, Washington, D. C.

July 26—(Docket 3966 et al.) Hearing reconvened in West Coast Airlines Certificate Renewal-United Air Lines Service Suspension Case. 10 a. m., South Lounge, Carlton Hotel, Washington, D. C. Examiner J. Earl Cox.

July 27—(Docket 4435) Hearing in Braniff Airways, Inc.-Local Excursion Fares Investigation. 10 a. m., Room E-214, Temporary Bldg. 5, Washington. Examiner Paul N. Pfeiffer.

July 31—(Docket 3605 et al.) Hearing in Lehman Brothers Interlocking Relationships Investigation.

Aug. 7—(Docket 2019 et al.) Hearing in Reopened Additional California-Nevada Service Case. Place and hour to be announced. Examiner F. Merritt Ruhlen.

Sept. 18—(Docket 4340) Hearing in Frontier Airlines Certificate Renewal-United Air Lines Suspension Case. Place and hour to be announced. Examiner Herbert K. Bryan.

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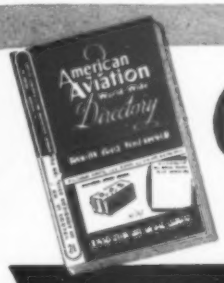

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How to meet a payroll (at a cost of $3.19)

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1949 Airline Salaries Reported to CAB

The following salaries, stockholdings, and remunerations have been reported by the airlines to the Civil Aeronautics Board for calendar 1949.

All American Airways, Inc.

Robert M. Love, pres. and dir., $15,000 salary, and 78,845 shares common; Charles W. Wendt, v. p., treas. and dir., $10,000 salary, and 11,700 shares common; Halsey R. Bazley, v. p. and dir., $10,000 salary, and 2,900 shares common; David L. Miller, sec'y and dir., $7,500 (up $1,125) salary, and 27 shares common; Harold G. Kenyon, ass't sec'y, $5,700 salary, and 100 shares common; Walter J. Short, ass't treas., $6,600 salary, and no shares; Martin Fenton, dir., no salary, and 1,000 shares common; Hamilton O. Hale, dir., no salary, and 1,000 shares common; Harry W. Lunger, dir., no salary and 13,500 shares common; Malcolm E. McAlpin, dir., no salary, and 500 shares common; James P. Miller, dir., no salary, and 3,000 shares common; Hugh E. Sharp, Jr., dir., no salary, and 200 shares common; William R. Waldeisen, dir., no salary, and no shares.

Hale, Stimson & Russell, New York, N. Y., legal counsel, 1949.. $18,000

Delta Air Lines, Inc.

C. E. Woolman, pres. & gen. mgr. & dir., $24,000 salary, and 32,037 common shares; C. E. Faulk, chrm.-bd. & dir., $12,000, and 8,836½ shares; Charles Dolson, v.p.-oper., $16,000, and 1,300 shares; Laigh C. Parker, v.p.-traffic, dir., $18,000, and 1,500 shares; L. B. Judd, comptroller-ass't sec'y & dir., $10,800, and 2,000 shares; M. S. Biedenharn, v.p. & dir., no salary, and 2,200 shares; Travis Oliver, treas. & dir., $1,200 salary, and 1,895 shares; C. H. McHenry, sec'y & dir., $1,200, and 1,500 shares; Catherine Fitzgerald, ass't treas., $4,150 (up $250), and 3,300 shares; D. Y. Smith, dir., no salary and 1,050 shares; Richard W. Freeman, dir., no salary, and 7,000 shares; Edward H. Gerry, dir., no salary, and 1,400 shares; Winship Nunnally, dir., no salary, and 10,000 shares; R. J. Reynolds, dir., no salary, and 113,900 shares; R. W. Courts, dir., no salary, and 50 shares.

Willkie, Owen, Farr, Gallagher & Walton, 15 Broad St., New York, N. Y., legal services (1946-47-48), $16,805.67.

Northeast Airlines, Inc.

Paul F. Collins, chrm. of Bd., no salary (down $1,250), and 2,000 shares common; George E. Gardner, pres. & dir., $17,900 (up $1,050) salary, and no shares; A. A. Lane, v. p., $14,400 (up $12,000) salary, and 10 shares common; Hamilton Heard, treas., $12,000 salary, and no shares; R. H. Hernstein, assistant treas., $7,200 (down $300) salary, and no shares; H. E. Foley, clerk, no salary, and 500 shares common; Jacqueline Cochran, director, no salary, and no shares; A. C. McMenimen, director, no salary, and 300 shares common; A. F. Fitzgerald, director, no salary, and 4,000 shares common; Radu Irimescu, director, no salary, and no shares; Eugene L. Vidal, director, no salary, and 15,000 shares common; G. L. Hancock, director, no salary, and no shares.

Foley, Hoag & Eliot, Boston, Massachusetts, general counsel, 1949.. $29,000.00 (plus out-of-pocket expenses)

Lybrand, Ross Bros. & Montgomery, Boston, Massachusetts, auditors, 1949 ..... 12,444.50

Continental Air Lines, Inc.

Louis H. Mueller, chrm-bd., no salary, and 22,450 shares common; Robert F. Six, pres. and dir., $30,000 (up $208.34) salary, and 1,000 shares common; C. C. West, Jr., v. p., $15,000 (up $83.34) salary, and 300 shares common; O. R. Haueter, v. p. oper., $15,000 (up $41.65) salary, and 763 shares common; Joseph A. Uhl, v. p. sec'y and treas., $12,916.74 (up $1,000.08) salary, and 1,117½ shares common; Ronald C. Kinsey, v. p. (Wash.), $10,382.98 (up $383.14) salary, and no shares; Dorothy V. Rylander, ass't sec'y, $3,966.74 (up $456.90) salary, and 50 shares common; Lawrence C. Ames, dir., no salary, and 7,600 shares common; Sheldon Cooper, dir., no salary, and 5,600 shares common; Leonard B. Daniels, dir., no salary, and 14,200 shares common; Frederick L. Ehrman, dir., no salary, and no shares; Marco F. Hellman, dir., no salary, and 4,500* shares; Josiah G. Holland, dir., no salary, and 2,600 shares common; Frank H. Ricketson, Jr., dir., no salary, and 500 shares common; Thomas Roberts, dir., no salary, and 62,050** shares common;

* 3,300 (amount beneficially) issued to but held by J. Barth & Co., in stock account for M. F. Hellman.

** Estate of William H. Erhart.

Holland and Hart, legal services, 1949	$12,000
C. Edward Leasure, legal services, 1949	13,000

Northwest Airlines, Inc.

Croil Hunter, pres., gen. mgr. and dir., $45,000 salary, and 4,000 shares common; L. C. Glotzbach, v. p. and ass't to pres., $17,000 (down 16c), 5 common; E. I. Whyatt, exec. v. p. and dir., $20,000, 5 common, and 1,974 preferred; A. E. Floan, v. p. and sec'y, $17,000 (down 16c), and 405 common; K. R. Ferguson, v. p. eng. and planning, $24,000 (up $6,000), 505 common; R. O. Bullwinkel, v. p. traffic, $15,000, and 5 common; L. S. Holstad, treas., $15,024.61 (up $24.61), 305 common; Frank C. Judd, regional v. p., $15,000, and 5 common; D. J. King, v. p. Orient region, $17,089.87 (up $1,239.87), and 705 common; Charles Stearns, ass't sec'y,* $5,499.98 (down $4,430.02), and no shares; William J. Eiden, ass't treas., $10,800, and 4 common; William Tudor Gardiner, dir., $120 (up $40), and 500 common; Robert M. Hardy, dir., $120, and 1,575 common; T. E. Irvine, dir.** $20 (down $100), and no shares; Joseph T. Johnson, dir., $140, and 900 common; Malcolm S. Mackay, dir., $180 (down $20), 1,500 common, and 3,200 preferred; Dr. Charles Mayo, dir., $180 (up $80), and 100 preferred; Alonzo Petteys, dir., $140 (down $60), and 1,700 preferred; William Stern, dir., $140 (down $40), and 1,500 common; Edwin White, dir., $160, 100 common, and 200 preferred.

* Resigned July 22, 1949

** Terminated April 18, 1949

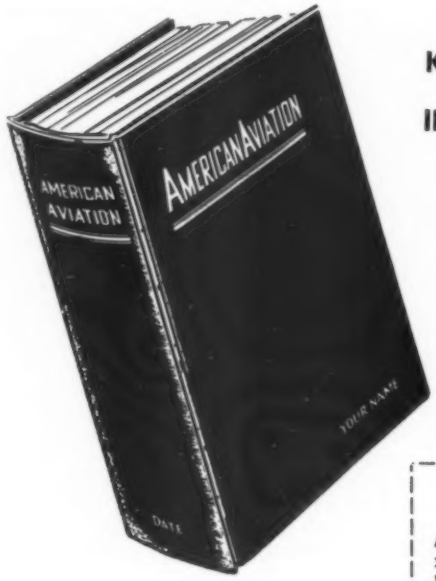
Robert S. Thach, Washington, D. C., legal services, 1949	$1,782.93
C. Edward Leasure, Washington, D. C., legal services, 1949	28,981.85
Ernst & Ernst, St. Paul, Minnesota, annual audit of books, preparation of Federal and various state income tax returns, analysis and consultation, examination of financial statement, and preparation of reports, 1949	12,261.06
Booz-Allen and Hamilton, Chicago, Illinois, organization survey of stati..n operations— October-December, 1949	13,540.14

Trans World Airlines

R. S. Damon, pres. and dir., $62,500 salary, $85 bonus and indirect, 1,200 shares common; Warren Lee Pierson, chrm.-bd., and dir., $58,749.98 (up $8,749.98), $55 bonus and indirect, 1,100 common; E. O. Cocke, v. p. sales and dir., $22,500 (up $2,925), $91 bonus and indirect, and 100 common; J. A. Collings, v. p. oper. and dir., $35,000 (up $3,380.76), $91 bonus and indirect, and 1 common; A. V. Leslie, v. p. and treas. and dir., $26,400, $91 bonus and indirect, and no shares; Palmer Bradley, dir., $900, $11 bonus and indirect, and no shares; Powel Crosley, Jr., dir., $500 (up $400), $11 bonus and indirect, and no shares; Noah Dietrich, dir., $400 (down $300), $11 bonus and indirect, and 1,000 common; A. B. Eisenhower, dir., $1,000, $11 bonus and indirect, and 120 common; Oscar F. Holcombe, dir., $600, $11 bonus and indirect, and no shares; Sidney Maestre, dir., $800 (down $100), $11 bonus and indirect, and 120 common; A. D. Simpson, dir., $900 (down $300), $11 bonus and indirect, and 120 common; N. S. Talbott, dir., $900 (up $100), $11 bonus and indirect, and 120 common; Loyd Wright, dir., $500 (down $100), $11 bonus and indirect, and 240 common; C. E. Fleming, v. p. regulatory proceedings, $17,375 (up $2,375), $91 bonus and indirect, and 61 common; G. H. Clay, sec'y, $12,919.62 (up $2,052.24), $91 bonus and indirect, and no shares.

NOTE: Remuneration of officers and directors is reported on a cash basis as is also compensation to others. This results in a reporting basis which is consistent with that employed in the previous year.

Chadbourne, Wallace, Parke & Whiteside, N. Y., legal counsel, October 1, 1948 to September 30, 1949	$284,420.83



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Airline Commentary

By Eric Bramley

OPEN LETTER to Eastern Air Lines: We live near Washington National Airport, and lots of airplanes go over our place. Even after several years in this business, we still look up to see what kind of an airplane is passing over and whose airplane it is. For some time now, we've noticed that EAL no longer has its name or initials painted on the under side of the wings of its planes, and we've only been able to identify them by other markings, which aren't easily discernible from the ground. We don't know why the name was removed, but it's one man's opinion that you've given up an effective way of keeping your name in the minds of a lot of people who still look up when planes pass over. How about a re-paint job?

•

Are scheduled air coach flights crowded these days? Someone asked a TWA official about the Connie coaches. The answer: "So crowded are the coaches that the only way the crews can get to the washroom is to turn on the 'fasten seatbelts' sign, and then dash down the aisle."

•

From **Frank Sheldon,** vice president—traffic of Caribbean Atlantic Airlines, we get two examples of super passenger service. "A passenger and his wife went to St. Croix for the weekend last month," he says. "On arrival at his hotel in St. Croix, he discovered that his wallet containing $120 was missing. As he was frantically trying to locate the taxi that had brought him to the hotel, our station manager phoned that the wallet had been discovered on the arrival of the return flight in St. Thomas by one of our porters (to whom $120 is a lot of money) and would be returned to him in St. Croix on the afternoon flight—which it was, with contents intact."

Second example: "A roll of unmarked and undeveloped film was left aboard one of our Ponce flights by a passenger living in the States. The film was discovered by one of our cleaners when the plane reached San Juan, and turned over to our station manager. He, being an amateur photographer, developed the film and was able through the prints to recognize one of the persons in the picture. He contacted this man, who lives in Ponce, and the very surprised owner of the film received the prints a short time later by air mail."

Frank Sheldon adds: "We may not be a big operator but we really do try to treat the customers right." If these two instances are typical, certainly no one is going to dispute that statement.

•

Alas, a step backward has been taken. The Chesapeake & Ohio railroad, which three years ago introduced a no-tipping rule on its dining cars, has decided to call the whole thing off and let the help pick up those loose shekels again. The explanation is interesting. It was issued by Thomas J. Deegan, vice president—passenger traffic (yes, it's the same Tom Deegan who was director of public information for American Airlines about five years back). Says he: the C & O still thinks tipping, "where the wage level is adequate, is a nuisance, an imposition on the customer, and a practice unworthy of American labor. Experience has shown that although the public complains about tipping, too many persons lack the courage to participate in an experiment that breaks with custom. Also, service employees too often are unable to suppress old habits of cadging tips even while pocketing the added compensation which was intended to replace tips." Mark well his statement about the public lacking courage, and apply it to tipping at airports.

•

As American Airlines' Convairs pass through Tulsa for engine change, new cabin-to-cockpit doors are being installed. They have a plexiglas observation window with a vertically sliding wooden door operated from the cockpit side only. Passengers can thus observe the cockpit without having access to it, and stewardesses are instructed that with the captain's permission they can invite a few people at a time to come up for a look. Sounds like darned good customer relations.

AIRLINE PEOPLE

ADMINISTRATIVE

James N. Ravlin, formerly with the state affairs department of American Airlines, has joined Northwest Airlines as assistant to Amos Culbert, vice president—sales. He will represent NWA in aviation industry and international affairs and will assist in CAB matters.

OPERATIONS-MAINTENANCE

Santos Ceyanes has been named manager of Pan American World Airways' Miami overhaul base, replacing **Joseph Dysart,** resigned. Ceyanes formerly was ground operations manager for PAA's Latin American Division, in which job he was succeeded by **Richard S. Mitchell,** former LAD superintendent of stations. **Arthur S. Best** moves up to Mitchell's old post.

Dudley S. Cox, chief pilot of Northwest Airlines' western region for the past five years, has been promoted to manager of flight operations for the airline, replacing **William F. Richmond,** who requested a return to active flying status. **Carl F. Luethi,** recently head of pilot training on NWA's Stratocruiser procurement project and before that system chief pilot, becomes chief pilot for the western region.

L. C. Cole, who has been district operations manager for Trans World Airlines at Rome, has been named international station manager for TWA at La Guardia Field. He replaces **Jerome T. Condon,** who goes to Lisbon as district operations manager.

Henry W. Coron, Jr., operations manager for American Overseas Airlines at Hamburg, Germany, since service to that city was established, is returning to this country to become operations manager at Elmira, succeeding **J. T. McNulty,** resigned.

Frank C. Bonner has been promoted from eastern regional supervisor of stewardesses for American Airlines to stewardess service representative in the general office of the division. **E. C. Taylor** takes over the regional post.

Capt. Robert H. Hancock has been named chief pilot for Robinson Airlines.

Richard M. Jackson has been promoted from staff engineer in American Airlines' planning division to assistant to G. J. Brandewiede, vice president-maintenance and supply. **Paul M. Bishop** takes Jackson's former position.

TRAFFIC & SALES

James Fulton Montgomery has been named district traffic and sales manager for Pan American World Airways in the United Kingdom. He formerly was Western Airlines' district sales manager for southern California.

A. S. Aldridge, former representative for Braniff Airways in Los Angeles, has been named U. S. sales manager of Philippine Air Lines with headquarters in San Francisco.

Ed Morgan, district manager of passenger sales for American Airlines in Los Angeles, has resigned to become western regional sales training manager for the Motorola Radio Corp. He was with AA for 14 years.

Russell M. Magill, formerly with United Air Lines, California Eastern Airways and Boeing Aircraft, has been appointed passenger agent for Pacific Northern Airlines at Juneau, Alaska.

Duncan H. Taylor, former assistant district sales manager for Northwest Airlines in Winnipeg, has been appointed city sales manager at NWA's new Edmonton station. **Col. W. F. Hancock** will continue to serve as special Canadian representative for the airline at Edmonton.

Jeanne Elaine MacIntosh, radio and television representative of the public relations office of American Airlines, has been transferred from New York to Hollywood.

Robert P. Hubley, former district sales manager for California Central Airlines at San Francisco, has been appointed general sales manager for the intrastate carrier.

Thomas J. Harris, formerly international cargo sales manager for American Airlines, has been named manager of cargo sales in the airline's eastern region, with headquarters in New York. He joined AA in 1938 in New York reservations and subsequently was stationed in Chicago, Cleveland and Baltimore.

John S. Hamm has been promoted from district traffic manager at Managua, Nicaragua, to sales training superintendent for the Latin American Division of Pan American World Airways. Before joining PAA in 1946, he had owned and operated an import-export business in Havana and has been associated with an aeronautical school at Sao Paulo, Brazil.

James E. McDonald, former district sales manager for American Airlines at Boston, has become central regional manager of cargo sales, replacing **J. S. Riordan,** resigned.

Roger Jarma has been appointed to the newly created post of district traffic manager for Pan American World Airways at Haiti. He has been station manager at Port-au-Prince.

Francisco J. Ochoa, veteran Mexico City newspaperman, has been appointed director of public relations for American Airlines de Mexico, replacing **Luis de Guevara,** who resigned to enter another business.

Robert C. Heyda has been appointed director of public relations of Frontier Airlines in Denver, with supervision over all advertising, publicity, internal and external publications and other promotional activities.

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U. S. Domestic Airline Traffic, April 1950

AIRLINES	REVENUE PASSENGERS	REVENUE PASSENGER MILES	AVAILABLE SEAT MILES	PASSENGER LOAD FACTOR	MAIL TON MILES **	EXPRESS TON MILES	FREIGHT TON MILES	TOTAL TON MILES REV. TRAFFIC	AVAILABLE TON MILES FLOWN	% AVAILABLE TON MILES USED	REVENUE PLANE MILES	SCHEDULED MILES	% SCHEDULED MILES COMPLETED
				%									
American	294,624	140,225,000	208,325,000	67.31	773,984	453,758	2,503,149	17,446,416	27,668,652	63.05	4,832,182	4,753,534	99.60
Braniff	52,594	17,536,000	32,703,000	53.62	102,744	80,227	125,674	1,989,399	4,242,755	46.89	924,209	919,076	99.81
Capital	113,980	34,599,000	62,863,000	55.04	109,245	171,500	702,843	4,292,537	7,916,128	54.23	1,724,510	1,690,541	98.44
Caribbean	6,843	560,000	1,163,000	48.15	1,621	. . . .	2,442	49,054	121,163	40.49	46,944	47,290	99.00
C & S	27,318	10,075,000	17,496,000	57.58	48,121	39,626	56,946	1,110,855	2,040,041	54.45	637,728	640,680	99.16
Colonial	14,349	3,757,000	7,532,000	49.88	7,024	5,821	7,082	397,347	885,759	44.86	242,250	240,569	98.72
Continental	16,651	5,685,000	13,739,000	41.38	16,794	7,889	39,124	608,116	1,430,139	42.52	485,833	483,180	99.89
Delta	55,310	25,533,000	42,680,000	59.82	93,917	70,264	216,908	2,845,150	5,653,609	50.32	1,255,851	1,236,023	99.71
Eastern	221,467	112,035,000	172,920,000	64.79	393,574	316,231	1,158,017	13,235,654	24,819,654	53.33	4,666,447	4,354,462	99.64
Hawaiian	30,867	3,927,000	5,677,000	69.17	4,803	10,970	36,255	384,753	615,353	62.53	254,904	190,964	98.13
Inland*	6,463	2,399,000	4,344,000	55.23	8,061	4,262	11,016	253,453	440,930	57.48	227,771	238,664	95.44
MCA	28,818	8,390,000	15,181,000	55.27	26,721	18,335	46,487	895,398	1,734,984	51.61	722,910	725,808	98.35
National	37,416	24,329,000	42,731,000	56.94	54,322	66,993	204,899	2,793,541	5,721,585	48.82	1,086,008	1,046,474	96.19
Northeast	26,817	5,005,000	9,342,000	53.58	9,527	13,206	18,453	505,393	934,179	54.10	296,272	297,915	95.03
Northwest	65,933	38,365,000	72,338,000	53.04	224,720	134,269	580,966	4,711,138	9,358,613	50.34	1,692,491	1,701,077	96.79
Trans Pac.	6,028	745,000	1,345,000	55.39	. . . .	43	1,003	59,369	144,577	41.06	54,625	22,443	100.00
TWA	121,482	79,618,000	126,793,000	62.79	674,013	403,082	920,954	9,635,002	16,700,024	57.69	3,598,766	3,536,348	99.63
United	183,140	102,945,000	160,320,000	64.21	902,842	627,736	2,175,498	13,570,261	25,040,522	54.19	4,347,993	4,228,376	99.73
Western*	43,673	15,483,000	27,542,000	56.22	47,888	39,103	56,584	1,621,208	2,953,693	54.89	688,149	614,308	98.78
TOTALS	1,353,773	631,211,000	1,025,034,000	61.57	3,499,921	2,463,309	8,864,300	76,404,064	138,422,760	55.19	27,785,843	26,967,732	99.09

* Operations of Western and its subsidiary, Inland, should be considered as consolidated, although reports are filed separately as shown here.
** Includes air parcel post.

U. S. Domestic Airline Traffic, March, 1950

AIRLINES	REVENUE PASSENGERS	REVENUE PASSENGER MILES	AVAILABLE SEAT MILES	PASSENGER LOAD FACTOR	MAIL TON MILES **	EXPRESS TON MILES	FREIGHT TON MILES	TOTAL TON MILES REV. TRAFFIC	AVAILABLE TON MILES FLOWN	% AVAILABLE TON MILES USED	REVENUE PLANE MILES	SCHEDULED MILES	% SCHEDULED MILES COMPLETED
				%									
American	171,682	85,492,000	140,870,000	60.69	619,426	354,453	1,870,886	11,306,552	19,051,134	59.35	3,299,278	4,804,606	67.95
Braniff	52,470	17,661,000	34,326,000	51.45	115,822	93,936	154,591	2,056,652	4,454,648	46.17	966,891	954,329	99.56
Capital	90,440	26,677,000	57,640,000	46.27	125,325	198,074	785,455	3,665,210	7,459,892	49.13	1,631,420	1,617,849	97.44
Caribbean	7,698	636,000	1,333,000	47.71	792	. . . .	2,269	54,170	136,167	39.78	52,758	51,697	98.14
C & S	25,514	9,115,000	16,682,000	54.64	48,517	49,086	72,241	1,044,701	1,945,583	53.70	605,263	613,189	97.51
Colonial	12,840	3,408,000	6,608,000	51.57	8,142	7,945	9,674	368,118	849,230	43.35	230,288	247,132	92.81
Continental	15,309	5,398,000	13,220,000	40.83	16,823	8,150	35,146	577,118	1,376,200	41.94	470,054	462,356	99.73
Delta	55,080	27,515,000	43,600,000	63.11	106,188	74,590	248,036	3,090,004	5,804,742	53.23	1,281,441	1,284,985	98.17
Eastern	230,081	123,130,000	181,462,000	67.85	452,800	371,747	1,083,797	14,744,945	26,074,940	56.55	4,900,347	4,685,854	97.29
Hawaiian	24,874	3,206,000	4,929,000	65.04	4,436	10,708	34,647	323,992	558,839	57.98	225,042	198,163	97.78
Inland*	6,296	2,241,000	4,329,000	51.77	8,326	3,978	9,512	236,718	434,317	54.50	228,763	244,714	93.39
MCA	27,228	7,982,000	14,682,000	54.37	26,337	18,605	38,291	848,360	1,677,948	50.56	699,145	704,630	98.12
National	40,360	27,372,000	44,145,000	62.00	72,813	81,832	213,683	3,154,742	5,907,245	53.40	1,115,947	1,076,383	97.31
Northeast	27,140	4,924,000	9,228,000	53.36	11,141	16,540	19,968	504,436	929,862	54.25	290,802	298,504	89.00
Northwest	54,654	31,294,000	68,960,000	45.38	243,453	139,633	573,824	4,030,766	8,929,361	45.14	1,716,638	1,759,978	95.48
Trans Pac.	2,979	356,000	919,000	38.74	. . . .	53	789	33,928	76,688	44.24	31,631	23,042	100.00
TWA	111,665	77,138,000	129,492,000	59.57	790,756	477,857	1,134,417	9,813,677	17,057,646	57.53	3,659,809	3,665,003	98.41
United	165,324	95,052,000	160,664,000	59.16	989,724	705,140	2,579,948	13,391,836	25,230,264	53.08	4,386,787	4,357,721	98.55
Western*	37,641	13,684,000	27,870,000	49.10	49,642	37,009	57,347	1,451,553	2,955,291	49.12	705,969	636,592	99.37
TOTALS	1,159,275	562,276,000	960,959,000	58.51	3,690,463	2,648,436	8,924,521	70,697,478	130,909,997	54.00	26,498,273	27,686,727	92.51

* Operations of Western and its subsidiary, Inland, should be considered as consolidated, although reports are filed separately as shown here.
** Includes air parcel post.

U. S. International Airline Traffic, April, 1950

AIRLINES	REVENUE PASSENGERS	REVENUE PASSENGER MILES	AVAILABLE SEAT MILES	PASSENGER LOAD FACTOR	U. S. MAIL TON-MILES*	FOREIGN MAIL TON-MILES	EXPRESS TON-MILES	FREIGHT TON-MILES	TOTAL TON-MILES REV. TRAFFIC	AVAILABLE TON-MILES FLOWN	% AVAILABLE TON-MILES USED	REVENUE PLANE-MILES	SCHEDULED MILES	% SCHEDULED MILES COMPLETED
				%										
American	7,026	5,059,000	8,831,000	57.29	8,250	2,941	889	111,513	671,352	1,187,023	56.56	181,373	175,703	100.00
Amer. O'Seas	9,569	14,477,000	23,004,000	62.93	171,943	49,886	219,241	. . . .	2,047,891	3,168,350	64.64	457,932	419,649	99.38
Braniff	1,299	2,617,000	7,363,000	35.54	2,105	943	. . . .	97,457	356,123	1,043,258	34.14	173,242	173,242	100.00
C & S	2,006	2,383,000	7,342,000	32.46	2,300	366	. . . .	44,935	293,706	881,062	33.34	178,417	178,417	100.00
Colonial	1,432	1,112,000	1,398,000	79.61	316	347	. . . .	5,859	126,638	190,100	66.62	30,416	28,366	99.05
Eastern	1,093	1,137,000	2,991,000	38.01	5,306	. . . .	. . . .	26,466	154,775	359,809	43.02	60,320	62,400	96.67
National	7,352	1,955,000	3,580,000	54.61	1,075	. . . .	21,380	. . . .	220,176	490,825	44.86	67,433	66,170	95.39
Northwest	3,940	7,897,000	14,011,000	56.36	193,593	28,475	7,255	479,602	1,569,945	2,390,347	65.68	546,396	488,744	99.48
Panagra	8,330	8,355,000	18,356,000	45.52	32,775	19,198	159,595	. . . .	1,131,118	2,463,971	45.91	479,319	471,090	100.00
PAA														
Latin Amer.	56,735	44,389,000	79,291,000	55.98	223,677	60,594	1,733,802	175,955	6,669,130	12,523,334	53.25	2,282,778	2,027,071	99.43
Atlantic	16,129	29,876,000	40,369,000	74.01	259,568	81,866	595,275	. . . .	4,248,705	6,383,286	66.56	1,043,087	969,715	98.27
Pacific	6,732	18,103,000	34,729,000	52.13	496,975	63,203	386,169	. . . .	2,825,791	5,212,099	54.22	806,602	786,011	99.96
Alaska	3,001	2,934,000	5,837,000	50.27	31,626	. . . .	345,571	. . . .	691,367	1,366,794	50.58	207,944	180,091	99.99
TWA	9,484	24,782,000	34,208,000	72.45	258,030	118,034	. . . .	456,511	3,555,199	5,251,397	67.70	940,905	913,478	99.48
United	1,769	4,246,000	7,875,000	53.92	52,032	. . . .	. . . .	23,177	536,037	1,046,526	51.22	144,000	144,000	100.00
TOTALS	135,817	169,323,000	289,185,000	58.55	1,739,571	425,853	3,469,177	1,421,475	25,097,953	43,958,143	57.09	7,598,364	7,864,597	99.37

* Includes air parcel post.

NOTE: Data in above tabulations were compiled by American Aviation Publications from monthly reports filed by the airlines with the Civil Aeronautics Board. Figures for American Airlines include that carrier's service to Mexico but not to Canada; for Braniff to South America; C & S to South America; Colonial to Bermuda; Eastern to Puerto Rico; National to Havana; Northwest to Orient and Honolulu, and United to Honolulu. Operations of U.S. carriers into Canada are included in domestic reports to CAB, in accordance with CAB filing procedures.

U. S. Domestic Airline Revenues & Expenses, April, 1950

Airlines	Total Operating Revenues	Passenger Revenues	Mail Revenues	Express Revenues	Freight Revenues	Excess Baggage Revenues	Non-Scheduled Transport Rev.	Total Operating Expenses	Aircraft Operating Expenses	Ground & Indirect Expenses	Net Operating Income
American	$ 9,058,437	$ 7,812,344	$ 463,645	$ 161,723	$ 495,332	$ 92,842	$ 11,086	$ 7,541,323	$ 3,638,111	$ 3,993,212	$ 1,517,114
Braniff	1,268,212	998,682	194,567	30,991	28,402	11,436	718	1,122,536	517,408	605,130	145,674
Capital	2,341,728	1,798,088	298,497	55,756	122,113	11,975	32,102	2,223,906	999,583	1,224,323	117,822
Caribbean	71,201	50,865	13,657	. . . .	2,487	355	634	69,954	31,023	38,931	1,247
C & S	744,878	558,520	149,230	13,544	13,346	6,498	916	680,857	288,608	392,249	64,020
Colonial	313,533	216,497	82,500	2,329	2,903	1,148	. . . .	370,634	168,601	202,033	-57,101
Continental	454,827	317,618	116,330	3,065	9,751	2,476	227	504,733	244,942	259,791	-49,905
Delta	1,686,979	1,446,083	140,718	21,970	40,674	21,708	2,300	1,407,425	695,747	711,678	279,554
Eastern	7,140,879	6,420,587	267,850	106,840	199,435	107,496	27,049	5,846,152	3,140,134	2,706,018	1,294,726
Hawaiian	317,767	260,416	2,882	11,373	19,839	6,579	15,844	279,941	108,326	171,615	37,826
Inland *	213,438	148,078	59,186	1,577	2,751	1,543	. . . .	192,508	83,066	109,442	20,930
NCA	639,280	485,156	125,578	6,988	10,039	4,293	4,817	573,017	224,172	348,845	66,263
National	1,557,746	1,328,804	142,192	20,616	22,198	24,293	13,581	1,212,219	625,519	586,700	345,129
Northeast	482,607	305,584	126,149	5,847	6,462	1,115	. . . .	491,487	255,746	235,741	-8,881
Northwest	2,414,183	1,984,305	248,591	48,171	104,012	13,563	3,293	3,067,166	1,625,290	1,441,876	-652,984
Trans Pacific	54,772	40,516	. . . .	135	772	613	11,448	56,813	24,055	32,758	-2,041
TWA	5,247,136	4,346,792	451,900	145,183	209,547	48,124	29,194	4,809,586	2,350,476	2,459,110	437,551
United	7,093,518	5,770,140	554,627	210,777	406,774	54,532	44,612	6,772,314	3,035,867	3,736,447	321,204
Western *	917,327	601,914	156,074	13,880	12,321	4,333	122,654	829,111	406,374	422,737	88,216
TOTALS	42,018,050	34,890,989	3,584,173	862,765	1,709,158	414,922	320,475	38,051,684	18,467,048	19,588,636	3,966,364

* Operations of Western and its subsidiary, Inland, should be considered as consolidated, although reports are filed separately as shown here.

Note: These figures are taken from monthly reports filed by the airlines with CAB. The data are tentative and subject to later change.

U. S. Feeder Airline Traffic for April, 1950

Airlines	Revenue Passengers	Revenue Passenger Miles	Available Seat Miles	Passenger Load Factor	Mail Ton Miles	Express Ton Miles	Freight Ton Miles	Total Ton-Miles Rev. Traffic	Available Ton-Miles Flown	% Available Ton-Miles Used	Revenue Plane Miles	Scheduled Miles	% Scheduled Miles Completed
All American	11,809	1,675,000	5,282,000	31.72	2,968	7,846	. . .	174,659	603,751	28.93	251,563	252,648	99.09
Bonanza	1,577	363,000	1,486,000	24.42	456	128	1,608	36,437	153,032	23.81	76,139	76,680	98.48
Central	785	95,000	474,000	20.04	1,226	. . .	. . .	10,466	45,710	22.90	158,167	158,040	98.12
Challenger	1,523	465,000	1,988,000	23.39	*	1,785	3,004	51,531	212,669	24.23	99,378	100,320	99.06
Empire	3,434	745,000	1,901,000	39.19	1,656	1,299	. . .	74,082	187,572	39.49	90,527	90,364	99.34
Mid-West	505	73,000	498,000	14.66	1,600	. . .	. . .	7,624	55,084	13.84	125,191	151,000	82.78
Monarch	2,525	655,000	2,718,000	24.10	2,030	2,184	8,323	78,379	254,310	30.82	150,978	156,960	96.51
Piedmont	9,766	1,999,000	6,276,000	31.85	3,704	5,341	8,660	209,044	717,226	29.15	299,105	300,320	98.97
Pioneer	10,306	2,806,000	7,295,000	38.46	7,271	3,249	9,647	301,957	728,369	41.46	303,487	307,450	98.71
Robinson	4,676	707,000	1,850,000	38.22	1,618	2,332	2,260	66,481	207,299	32.07	95,042	91,020	99.55
Southern	2,671	460,000	3,028,000	15.19	3,365	3,708	. . .	51,014	273,525	18.65	144,188	144,300	99.92
Southwest	9,438	1,702,000	4,040,000	42.13	3,886	4,281	10,800	189,714	404,287	46.93	192,426	193,458	99.34
Trans-Texas	4,762	1,070,000	5,161,000	20.73	4,560	1,799	5,030	118,867	349,589	34.00	245,757	246,180	99.79
Turner	1,285	393,000	1,019,000	38.57	515	1,129	1	38,927	108,462	35.89	87,566	77,280	91.64
West Coast	5,802	778,000	2,052,000	37.91	671	1,079	. . .	72,971	207,351	35.19	97,713	97,380	99.81
Wiggins	241	20,000	113,000	17.70	164	. . .	. . .	1,415	11,227	12.60	28,808	36,600	77.09
Wis. Central	3,654	553,000	1,358,000	40.72	2,794	3,467	. . .	58,432	140,738	41.52	165,638	179,100	92.48
TOTALS	74,779	14,559,000	46,539,000	31.28	38,484	39,627	49,333	1,542,000	4,660,201	33.09	2,611,673	2,659,100	97.06
Helicopter Mail Service													
HAS	. . .	. . .	. . .	. . .	1,659	. . .	. . .	1,659	4,095	40.52	26,817	26,853	99.87
Los Angeles	. . .	. . .	. . .	. . .	3,597	. . .	. . .	3,597	10,906	32.98	28,109	28,803	97.59

* Figure not reported to CAB.

U. S. International Airline Revenues & Expenses, Jan.-March, 1950

Airlines	Total Operating Revenues	Passenger Revenues	U. S. Mail Revenues	Foreign Mail Revenues	Express Revenues	Freight Revenues	Excess Baggage Revenues	Non-Scheduled Transport Rev.	Total Operating Expenses	Aircraft Operating Expenses	Ground & Indirect Expenses	Net Operating Income
merican	$ 1,024,616	$ 874,932	$ 22,691	$ 18,763	$ 875	$ 64,727	$ 13,552	$	$ 1,030,915	$ 532,908	$ 498,007	$ -6,299
mer. O'Seas	4,304,496	2,665,085	982,650	283,257	294,477	. . . .	30,429	26,486	5,551,063	2,886,841	2,664,222	-1,246,567
raniff	1,046,232	584,716	400,476	8,734	. . . .	32,607	17,818	. . . .	1,111,153	511,855	599,297	-64,921
& S	969,201	524,557	372,696	3,576	. . . .	47,276	19,340	. . . .	989,037	500,524	488,513	-19,836
lonial	153,666	105,997	42,265	403	. . . .	1,790	208	. . . .	233,031	92,698	140,333	-79,365
estern	293,152	218,892	10,128	. . . .	. . . .	18,868	2,763	42,500	226,626	109,000	117,626	66,526
tional	407,278	377,637	-706	. . . .	23,891	. . . .	6,082	375	422,027	168,212	253,815	-14,749
rthwest	2,906,698	1,044,447	1,335,782	106,389	5,307	394,562	11,820	8,100	2,567,353	1,248,461	1,318,891	339,345
agara	3,672,739	2,316,853	927,433*	171,666	180,393	. . . .	81,759	9,379	3,310,637	1,595,938	1,714,698	362,103
A												
Latin Amer.	14,733,411	9,538,137	2,470,184**	442,167	1,799,929	. . . .	281,185	59,378	14,636,274	6,596,738	8,039,536	97,137
Atlantic	11,815,646	4,525,831	5,960,127**	494,318	713,672	. . . .	107,823	. . . .	11,340,942	6,147,593	5,193,349	474,704
Pacific	9,056,411	3,272,597	4,912,460**	298,593	461,051	. . . .	35,613	22,226	8,142,313	4,497,580	3,644,734	914,097
Alaska	1,187,088	418,341	570,231**	. . . .	193,903	. . . .	3,183	. . . .	1,112,674	519,015	593,658	74,415
A	8,154,091	4,341,811	2,234,671***	788,236	. . . .	558,836	126,366	2,398	8,050,631	4,050,060	4,000,571	103,460
ited	855,282	677,822	101,336	. . . .	. . . .	29,776	4,437	. . . .	1,408,688	876,875	531,813	-553,406
TALS	60,580,007	31,487,655	20,342,424	2,616,102	3,673,498	1,148,442	742,378	170,842	60,133,364	30,334,298	29,799,063	446,644

* U.S. Mail pay accrued on basis of Show Cause Order dated April 12, 1949.

** Represents company's estimate of amount which should be received in accordance with terms of the Civil Aeronautics Act when permanent rates are established. Estimate exceeds temporary rates in effect by:
Latin American Div. $666,641; Atlantic Div. $3,563,788; Pacific Div. $2,021,844; Alaska Div. $276,539

*** U.S. Mail revenue is computed at rates in effect prior to issuance of Show Cause Orders E-3551 dated November 14, 1949, and E-3682 dated February 7, 1950, issued by the CAB proposing a reduction in rates of compensation for carriage of U.S. mail over TWA's international routes.

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AIRPORTS
Including Features Formerly in AIRPORTS AND AIR CARRIERS Magazine

'Triple-Flo' Design Aimed At Speeding Traffic Handling

By KEITH SAUNDERS

ALEX MUNRO, CAA traffic controller at Miami International Airport, is convinced that a man has to do more than just build a better mousetrap in order to have the world beat a path to his door.

For Munro has designed what he believes to be a better "mousetrap," namely, a better airport design than those conventionally employed, but to date he has met with nothing but frustration in his efforts to find a sponsor for such an airport.

Munro's Triple-Flo design, so called because it theoretically makes possible a tripling of the flow of traffic into and out of the airport, consists of an open-faced triangle with 7,000-foot runways along its three sides and the terminal building and control tower in the center. Vehicular traffic would be fed into and out of the terminal by means of elevated roadways running through the wide jaws of the three pairs of runway ends.

Runways Separated

Each of the three runways would be on the outer perimeter of its own individual segment of the triangle. Any comparable point on either of the three strips would be equally distant from the terminal. And no runway would cross or connect at any point with any other runway, a most important feature from the operational and safety standpoint.

Another important feature of the Munro design is the provision of stabilized surfaces or "roll-off areas" bordering the runways on the side toward the terminal. This would permit landing aircraft to angle off on the inside strip long before reaching the end of their landing roll, thus allowing the next incoming plane to land more quickly or an outbound plane to take off more quickly than would otherwise be the case.

It is the complete separation of the runways that makes Munro's design unique and, he thinks, highly practical. This feature will permit simultaneous use of all three strips under some conditions and simultaneous use of at least two of them most of the time.

Weather averages were a major factor influencing the final design of the Triple-Flo Airport. Munro made a study of this subject and found that wind velocities were less than 15 miles per hour at least 75% of the time on most airports, that dead calm prevailed about 16% of the time, that winds of 15 to 30 mph could be expected about 8% of the time, and over 30 mph just 1% of the time.

However, during the 75% of the time when landings could safely be made on any of the three runways at an airport of conventional design, only one runway was in active use and the other two were just so much "deadwood." This is because runways intersect with or cross one another on conventional airports and traffic cannot be permitted on two of them simultaneously because of the danger of possible collision. Munro's design is aimed at eliminating this danger.

Fast Traffic Handling

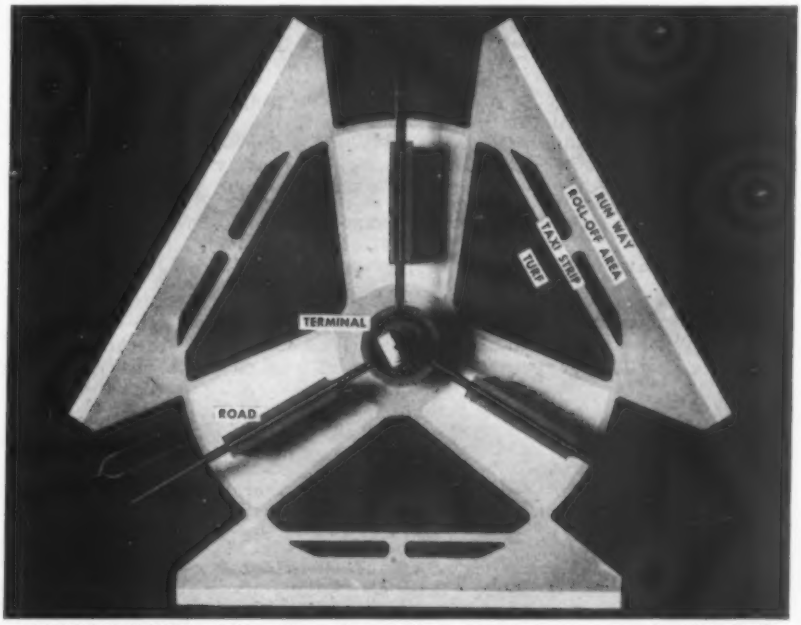
Because of the provision of ample unexposed warm-up areas and the simultaneous use of two or more runways, Munro claims an airport built from his design can get traffic into the air two to three times as fast as a conventional airport, while multi-runway use and the roll-off areas will enable incoming traffic to be handled with about the same speed.

Three elevated roadways fanning out from the terminal at the hub of the Triple-Flo Airport would easily handle all vehicular traffic. Hangars and other types of buildings could be beneath or adjacent to these roadways, according to Munro.

Summing up, Munro claims adoption of his airport plan would:

1. Eliminate costly delays attributed to extensive taxiing, go-arounds to avoid other obstructing aircraft, and departure and arrival holding while awaiting clearance.

(*Continued on page* 52)



TRIPLE-FLO DESIGN of Alex Munro features three separated runways, each with 'roll-off area' to permit landing aircraft to angle off on inside strip before finishing roll, thus allowing another plane to land or depart with minimum of delay.

AIRPORT NEWS DIGEST

• **The Fort Worth City Council** has leased Greater Fort Worth International Airport to a private corporation—Fort Worth Air Terminal, Inc.—for period of 38 years and three months. The $750,000 paid the city for the lease will be used to defray the city's part of the estimated construction cost of a terminal building. All facilities of the new airport are included in the lease.

• **The Philadelphia City Council** has voted to accept a $600,000 Federal contribution toward construction of a new terminal building for Philadelphia International Airport. Council at the same time allocated $4,000,000 from a councilmanic loan for the proposed building, and this, with other money already available, will be sufficient to erect the $7,000,000 building.

• **The government's lease** on the Landing Aids Experiment Station at Arcata, Calif., was permitted to expire on June 30 and the property was taken over by Humboldt County, which will operate it as a county airport. The field has been leased by the government for the past eight years.

• **An airport bond issue** will be submitted to the voters of Mercer County, West Virginia, in the primary election on August 1. The $600,000 worth of bonds will be sold and expended only if the Federal government provides matching funds.

• **The Petersburg (Va.) city council** has again refused to accept an "instrument of transfer" from the CAA for return of Petersburg Municipal Airport without assurance that the city would have to operate the field unless Congress appropriates money to put it in as good condition as when the Navy took it over in the middle of the war.

• **San Francisco doesn't know yet** whether its proposed $4,750,000 airport terminal building will be functional, modernistic or both. The Art Commission, which must approve all public buildings under the City Charter, has refused to approve the building plans drawn by Architect W. P. Day and accepted by the Public Utilities Commission.

• **Norfolk (Va.)** has approved a $774,000 bond issue that will be used to build the access roads, parking spaces and other outside facilities required before the new airport administration building, now virtually completed, can be used. The CAA will refund $381,500 to the city when the work is completed.

• **New airports dedicated** recently include that at Vicksburg, Miss., Gardner, Mass., and Cairo, Ill.

• **The last phase of the $625,000 expansion program** at Youngstown (O.) Municipal Airport got under way with the breaking of ground for the new administration building wing, due to be completed in September. Other improvements include runway lengthening and construction of a new apron and taxiways.

• **The City of Beverly, Mass., has regained title** to its airport, which was turned over to the Navy in 1942. Renamed John Mountain Field, the airport comes back to the city with close to $3,000,000 of improvements.

• **Entire costs of Los Angeles International Airport** and San Fernando Airport have been budgeted at $1,468,630 for the fiscal year beginning July 1, with revenues expected to at least equal the costs, which are $400,000 over this year's budget.

• **A pay-as-you-go plan adopted for Seattle's** Boeing Field in January, 1948, at the insistence of Dayton Witten, the then new manager, has worked unusually well, according to a recent report. The field formerly was operated out of the county's general fund, with income turned back into the general fund.

• **Homeowners in subdivisions just south of** Phoenix's Sky Harbor Airport are suing the city for $203,000 in damages, claiming that planes operating off the northeast-southwest runway at the field have damaged their homes, depreciated the market value of their properties and constituted a hazard.

2. Increase the safety margin under IFR conditions through establishment of a standardized control procedure on all similar airport systems.

3. Sharply reduce engineering and construction expense due to its highly simplified design detail.

4. Benefit from an ability to grow internally rather than require the purchase of additional property in the course of expanding airport installations. (Total area of the Triple-Flo Airport would be about 2,000 acres, with approximately 45% of the land within the triangle available for the necessary buildings.)

Munro is confident that a few months of operation of such an airport as he proposes would convince the CAA and other agencies of the merits of the design. His major hurdle now is to interest someone in putting up the money to build a Triple-Flo Airport. He has knocked on many doors with this aim in mind and has received favorable comments from a number of sources, but to date he has not been able to line up the needed financial support.

He intends to keep trying, though, because he believes that his plan offers a practical solution to the problem of traffic congestion at major air terminals. He has patented it, but insists he is not interested in making money on the Triple-Flo Airport design but merely wants to help speed up air traffic control and increase the capacity of the nation's airports, both commercial and military.

CAA Airport Grant Offers

For the last two weeks in May, the Civil Aeronautics Administration made Federal-aid airport grant offers totaling $617,135 to 31 communities, as follows, with airport classes in parentheses:

Alaska: Angoon Seaplane Base, $4,500; Baranof SPB, $4,500; Craig SPB, $4,500; Gastavus SPB, $4,500; Hyder SPB, $4,500; Hood Bay SPB, $4,500; Ketchikan SPB, $4,500; Latouche SPB, $4,500; Port Althrop SPB, $4,500; Sitka SPB, $6,300; Tamgass SPB, $6,000; Todd SPB, $4,500, and Whittier SPB, $4,500.

California: Madera Municipal (3), $8,719; San Luis Obispo Airport, Paso Robles (4), $11,000; Pismo Beach Airport (1), $35,660; Yuba City (2), $6,497.

Colorado: Limon Mun. (2), $2,300; Monrose Mun. (3), $23,153.

Connecticut: Bradley Field, Windsor Locks (4), $94,000.

Georgia: Chatham Field, Savannah (6), $50,000.

Michigan: Pontiac Mun. (2), $25,600.

Nebraska: Curtis Mun. (2), $12,700.

North Carolina: Pinehurst-Southern Pines Airport (3), $4,000.

South Carolina: Capitol Airport, Columbia (5), $50,000.

South Dakota: Aberdeen Mun. (4), $66,282; Hot Springs Mun. (3), $89,900.

Tennessee: McMinn County Airport, Athens (1), $9,000; Dyersburg Mun. (3), $26,800.

Utah: Vernal Mun. (3), $35,220.

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Firestone Pushes Research:

Rubberized Runways Next?

What will be the next major development in airport paving materials?

It could very well be rubberized runways, according to the Firestone Tire & Rubber Co. and the Natural Rubber Bureau, both of which are keenly interested in this subject.

The use of rubber in paving surfaces really isn't new, for it has been a project of the Firestone experimental laboratories for close to a quarter of a century, but the research in this field has been accelerated in recent months as a result of encouraging reports from test installations both in this country and abroad.

Rubber paving blocks are far too expensive for use in ordinary highway or runway paving, but combinations of various types of rubber with asphalt mix and with concrete have been used experimentally with interesting results in South Africa, Netherlands, England, Australia, Java and in the United States.

Firestone's experiments have encompassed the use of powered rubber in all its forms, including powdered natural rubber, powdered synthetic rubber, and processed vulcanized rubber in powder form.

It has been found that the use of rubber powder in asphalt surfacing has the effect of binding the asphalt more tightly into the road and, at the same time, tends to prevent the softening and breaking down of the pavement under heavy traffic in hot weather.

In cold weather, the rubber has the effect of retarding contraction and therefore helps prevent water and frost from penetrating and disintegrating road surfaces.

In other words, rubber acts as a modifying agent and gives every promise of extending the life of roads and runways and substantially reducing repair and maintenance costs.

In addition to being economical, rubberized runways are likely to be safer because of improved traction properties. They enable planes to be brought to a stop more quickly when brakes are applied, they minimize skidding, and they have a tendency to resist ice formation longer than do roads of the ordinary asphalt variety.

Harry K. Fisher, consultant with the Natural Rubber Bureau, recently returned from a tour of inspection of rubber road installations in foreign countries and was quite enthusiastic about what he saw.

For example, he saw a test rubber road laid in Holland just before the war. After 12 years of travel abuse, including heavy military traffic, this road is still in good condition and has

Wall of Glass—Visitors to Prescott (Ariz.) Municipal Air Terminal can view the airfield and the nearby hills in true comfort through this 250-square-foot window wall, made up of 28 large units of Thermopane insulating glass. Airport is located about midway between Los Angeles and Albuquerque and is a popular meal and refueling stop for private flyers and non-scheduled air carriers as well as a stop on Bonanza Air Lines. Principal materials used in the western ranch-style terminal are concrete, knotty pine, flagstone and insulating glass.

had no repair whatsoever. Considering the expensiveness of runway maintenance, he thinks airport people will be greatly interested in following developments in this field.

In this country, experimental installations of rubber paving mixtures have been made in Ohio, Virginia, Texas, Florida, Minnesota and Massachusetts, and a number of other states are embarking on experimental programs of their own during 1950.

Meanwhile, leading universities are carrying out projects evaluating the advantages of incorporating various types of rubber in paving materials. Firestone technicians are cooperating with these universities and with state highway commissions on many of these projects, in addition to those which it is conducting in its own experimental development program.

Rubberized runways may be a coming thing. At least, they will bear watching.

AIRPORT PEOPLE

Oscar Parks, one-time manager of the Greater Cincinnati Airport and prior to that manager of Lindbergh Field, St. Louis, for 20 years, will become manager of Blue Grass Field, Lexington, Ky., on August 1. He will succeed **P. G. (Pete) Powell,** who has resigned to devote full time to his business interests.

John J. McNamara has been named manager of Pounds Fields, the municipal airport at Tyler, Texas, succeeding the late **Col. O. C. Palmer.**

R. W. F. (Bob) Schmidt, manager of Tucson Municipal Airport, and **Jack Gray,** manager of Atlanta Municipal, have accepted appointments to serve on CAA's Airports Advisory Committee when terms of the present committeemen expire.

Walter E. Mathiot, a veteran of both world wars, has been selected as manager of the new municipal airport at Marion, Ohio.

John Bogie has taken over management of the Saranac Lake (N. Y.) Airport, succeeding **Mr. and Mrs. Harold Rideout, Jr.,** who have gone to the west coast.

J. Tolliver and **Travis A. Gannon** were chosen as co-operators of the new Harrisburg-Raleigh (Illinois) Airport.

D. Robinson, formerly at Kansas City Municipal, is the new manager and fixed base operator at Atlantic, Iowa.

Richard A. Harding, manager of Santa Barbara Municipal Airport, is the new president of the California Association of Airport Executives. He succeeds **Woodruff De Silva,** manager of Los Angeles International Airport.

BETTMANN ARCHIVE — COPPER ENGRAVING—XVIII CENT.

The myth of Icarus* indicates that he had little difficulty in flying. But with no way of measuring his proximity to the sun, his attempt proved ill-fated.

So with modern flight. Although man learned to fly shortly after the turn of the century, it was not until the late 1920's that flying—thanks to precision instrumentation—ceased to be a highly hazardous adventure and took on the aspects of an exact science. It was at this same time that the name of Kollsman became synonymous with precision flight—a position in the instrumentation field that has never since been challenged.

Measure of Safety

Kollsman inventiveness and engineering skill today continue to pace and anticipate the needs of the aviation industry. In this age of supersonic speeds—when an extreme measure of accuracy is vital to safety—Kollsman instruments unerringly point the way to aviation's illimitable future.

*The ancient Greek who, by flying too close to the sun, caused the wax that secured his feathered wings to melt, whereupon he plunged into the sea.

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Good Sales Potential In

NARCO lightplane omnirange equipment is available with custom designed panels such as for Beech Bonanza shown above. Course needle at top left shows aircraft is on course. Instruments at bottom left are for tuning in omnirange station and indicate whether course selected is that To or From the station.

MITCHELL AVIGATOR is lightplane low frequency and omnirange set which indicates the track from the station to the plane. When lubber lines on instrument to the left are kept aligned with the needle, the aircraft is on course and drift is automatically compensated for.

OMNI-MAG instrument by Bendix is latest to simplify omnirange cockpit readings, combines three instruments in one. With it, pilots can fly magnetic compass course, ILS glide path and omnirange.

By BARBARA WARD

A REVOLUTION is taking place in aircraft radio equipment, comparable to what would happen with home radios if all commercial broadcasting stations were to be converted to television.

"The decommissioning of four-course ranges will be begun in 1952 and completed by 1954", according to C. F. Horne, CAA director of Federal Airways. In other words, within four years, every pilot flying who learned to use radio navigation before or during the war will need to learn how to fly omniranges; and every aircraft equipped for cross country instrument flight will need an omnirange set.

The salesmen of aviation—fixed base operators, flight school operators and aircraft distributors—should find in omnirange a tremendous sales potential.

Surprisingly, it is the private pilot who is spearheading the use of the omnirange for contact cross country navigation. When he finds out what it will do, he wants it. Already about 2,500 omnirange sets are installed in private aircraft and airlines are using it as auxiliary navigation equipment. With 260 omnirange stations operating and commissioned of the approximately 400 omnirange stations planned for the United States, omniranges are useable now.

The equipment has two obstacles to hurdle:

First, unfamiliarity breeds distrust and aviation salesmen have to to find a way to teach potential buyers the advantages and use of the equipment without frightening them away with technical terms;

Second, the cost of the cheapest lightplane omnirange set is still about three times the $200 one would spend on low frequency radio equipment.

Sales Potential

The cost will start down as equipment is developed and as the market grows. An estimate of the sales potential can be made from 1948 CAA figures, the latest available, which list 6,570 non-scheduled aircraft equipped with receivers and 32,020 non-scheduled aircraft equipped with receivers and transmitters. Within the next two to four years, someone can sell approximately 35,000 personal aircraft omnirange sets.

Easy to Use

An omnirange course which can be given by flight school operators is now being prepared by a committee of the Aeronautical Training Society, at the suggestion of Aircraft Owners and Pilots Association. Since the equipment is simple, about two hours of instruction should check any pilot out on its use.

The omnirange station could be compared to a wheel with 360 spokes, one for each degree of the compass. Instead of having to get on one of four range legs to fly to the radio station, you can fly a "spoke" or course in from any location. Not only is navigation direct, but the VHF omniranges eliminate the static of dust, precipitation and thunderstorms and can be received clearly 30 miles out at 500' and 100 miles out at 5000' above the ground.

With the simplest omnirange set, you can take your own fix. Tune in to an omnirange station and determine which "spoke" you are on, then tune in to another omnistation and determine which "spoke" from that station you are on. Draw the lines on your map and you are where they intersect. This one feature of the omnirange could have saved numbers of planes flying the Hump during World War II.

To use the omnirange, you tune in the station and listen for station identification as with the old low frequency ranges. Then, unless you want to listen for weather reports, you take off the earphones and look at your instrument panel which tells you, "There is the station," and "Here is how you get to it."

Equipment Available

Different manufacturers of omirange equipment portray this information in different ways:

● **National Aeronautical Corp.** of Ambler, Pa., has just announced that it has produced its 1,500th omnirange receiver. The NARCO omnirange set, developed for lightplanes under a $20,000 CAA contract to CAA specifications, presents its information on three basic instruments.

After tuning into the station, the pilot must determine which "spoke" or course line of the station he is on. A course selector dial, which looks like any radio dial, is turned until the course needle comes from the side of its instrument to center and indicates that you have selected the course or straight line which goes from you through the station.

Since you may be on the "spoke" to or that from the station, you look at a third instrument, a To-From indicator. If it reads "From," turn the selector dial through 180 degrees and you have

In Omnirange Equipment

set up your course to the station. Turn the aircraft to the heading selected and fly the left-right course needle. If it goes to the left, your course is to your left and you turn left to get back on it. Keep the needle centered and it will take you straight to the station. As you near the station the needle becomes more sensitive and, as you pass over the station, the To-From indicator will swing to read "from."

The complete NARCO omnirange set sells for $609 and weighs 16 pounds.

● **The Mitchell Avigator,** with Dave Rumph Co. of Fort Worth, Tex., as factory representative, has combined all its omnirange information on one instrument. The omni indicator dial is lighted by a neon light which burns steadily when the station is properly tuned in and blinks a warning if the station is off frequency or the equipment is not working properly.

The instrument has an omni needle which shows the track from the omni station to you, and a rotatable glass dial with parallel lubber lines. The lubber lines are similar to those used on magnetic direction indicators and, when aligned with the omni needle indicator, give the course to the station. By keeping the omni needle centered within the lubber lines, drift is automatically compensated and one flies a straight line to the omnirange station.

The Avigator is several radios in one. It has a 75 mc marker beacon receiver, a low frequency range receiver which can be used as one flies the omnirange, and a standard loop for range and broadcast stations as a position verifier.

Weight of the Mitchell Avigator with omni indicator and all accessories, including antenna, is 20 pounds. Price is $635.

● **The Lear Omnimatic,** produced by Lear, Inc. of Grand Rapids, Mich., was the first lightplane omnirange equipment to fly, late in 1948. It has one omnirange flight instrument, an omniscope dial which is marked off in compass degrees. When the set is tuned in to an omnirange station, a circular pattern lights up on the dial with a sharp hump or "pip" pointing to the magnetic bearing or track to the omnirange station.

The instrument has no course needle and no To-From indicator; the reading is instantaneous and automatic. It has an excellent fail-safe feature since, if the omnirange station becomes inoperative or the receiver tuning dial is turned off inadvertently or there is internal failure, the pattern on the indicator will disappear. For use in flying ILS approaches, a switch converts the bearing pattern on the omniscope to a left-right indication. The light on the dial can be turned dim for night flying.

Lear VHF radio equipment is available with or without the omniscope. The two-way VHF receiver and transmitter cost about $525 and the omniscope indicator, power supply and accessories cost an additional $475. Weight of a complete set is 24 pounds.

● **The Omni-Mag,** produced by **Bendix Radio Division,** Baltimore, Md., is the latest equipment to combine all essential omnirange information in one instrument.

The basic element of the instrument is the ILS cross bar, of which the vertical bar is used as the omnirange course needle. A window showing the course you have selected by turning a knob, and a To-From window are located at the outside of the instrument.

Bendix has added a heading pointer which works from the magnetic compass to show the aircraft heading with relation to the omnirange course selected. The pilot simply flies the pointer, pointing it as he would the nose of his plane. The instrument can also be used to fly the glide path—in short, it has everything.

The Omni-Mag operates in conjunction with ARINC standard equipment already in use. List price of the Omni-Mag unit is $1200.

● **The Aircraft Radio Corp.** of Boonton, N. J., has produced for executive aircraft and airlines a Type-15B Omnirange set which receives on 108-135 mc. and has an ILS cross bar instrument, a course selector instrument with an arrow pointing to the "fix" of the omnirange station, and a To-From instrument.

It can be used to fly an omnirange track, to obtain on omnirange "fix," for making ILS glide path approach, and for reception of voice on the same frequency that localizer or range signals are being received. The cross bar instrument can be used for flying the glide path, or the vertical needle becomes a course needle for flying the omnirange.

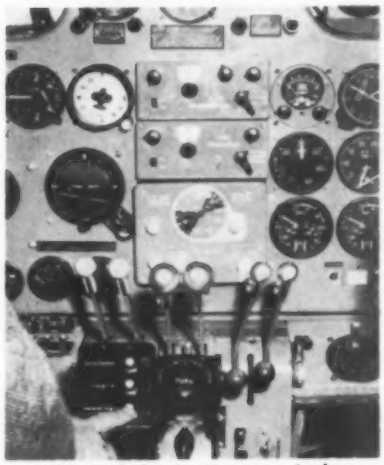
Accuracy and sensitivity are designed into the equipment, which weighs about 22 pounds and is used in many Bonanza and Navion aircraft. Cost is about $1800.

● **Collins Radio Co.** of Cedar Rapids, Io., has developed several methods of depicting omnirange information. The company specializes in equipment for airline and executive aircraft and has sold and delivered 1,200 units to airlines, government departments and private aircraft.

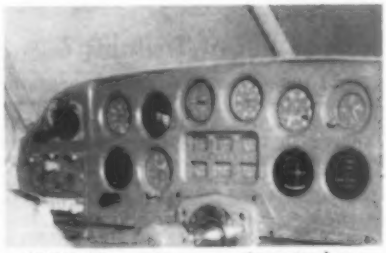
Using the vertical bar of the ILS cross-bar indicator as a course needle to give left-right indications, the Collins Bearing Selector completes the omnirange picture. The pilot turns a knob on this instrument through compass headings until the course needle centers. This indicates that he has selected the line which goes from him through the omnirange station.

The To-From flag on the selector in-

(*Continued on Page* 59)



LEAR'S VHF Omnimatic system is shown in lower of three boxes, center above, and white dial face instrument. The white dial omniscope has lighted pattern with "pips" indicating track to the omnirange station. Pattern goes out if station or aircraft equipment is malfunctioning.



COLLINS omnirange equipment shown in Beech Bonanza combines course selector and To-From indicator (right) and uses vertical needle of ILS cross bar as the course indicator.

AIRCRAFT RADIO CORP. omnirange equipment, shown installed in Ryan Navion, features course selector dial (top left), course needle combined with glide path (top right) and To-From indicator located just above control wheel.

For Local Operators

USAF Contracts for Civilian Training

Two civilian aviation schools, **Spartan School of Aeronautics**, Tulsa, Okla., and **Cal-Aero Institute**, Glendale, Cal., have been awarded Air Force contracts to train 275 Air Force airplane and engine mechanics each.

Air Force officials will be watching the results to see whether it will be cheaper and more effective to have civilian schools train technical personnel rather than doing it themselves. The report of the Stanford Research Institute told them it would. If these schools succeed, a closer relationship between the Air Force and civilian facilities will result, with more civilian training to follow.

The present contracts total $592,500 with training scheduled to begin August 1, 1950, and be completed by June 30, 1951. Students will be assigned from the USAF Indoctrination Center at Lackland AFB, San Antonio, Tex., for training periods of 36 weeks.

In awarding the contracts, the USAF evaluated applicants by cost; school background; community statistics; climate and geography; available training space and facilities; housing; messing; hospital facilities; instructional facilities; qualifications of instructors; and available training equipment.

The USAF has not yet decided which civilian flight schools will take over management of one of the four USAF basic flight schools on a similar test basis.

College Flight Training?

Fixed base operators located near the approximately 127 colleges having Air ROTC units may soon have the opportunity to give Air ROTC flight training. A bill, S.3846, introduced in the Senate by **Sen. Millard Tydings**, (D-Md.), would authorize the Air Force "to contract with civilian flying or aviation schools or educational institutions to provide the necessary personnel, aircraft, equipment and facilities and conduct flying instruction, including aerial flights, for enrolled members of the Reserve Officers Training Corps."

The Air Force wants this bill to pass. To begin with, local flight schools can screen pilots in lightplanes, at a lower cost than AF can do it in the T-6 basic trainer. Also, the AF is assured a high caliber cadet with a college education.

The student who enrolls would get financial help in obtaining a college education—payment of $50 a month for not to exceed two years of college, tuition and fees up to $500 a year, uniforms and medical attention. In return, the student must agree to complete his college education; to take certain minimum military courses in college; to accept a reserve commission if it is offered to him; and to serve on active duty for three years subsequent to completion of training leading to an aeronautical rating, unless sooner relieved.

The bill lay in the Bureau of the Budget for about three months until trouble broke out in Korea. However, whether it can pass in this session of Congress remains to be seen. According to **Wayne W. Weishaar**, secretary of the Aeronautical Training Society "It will be nip and tuck. But if it doesn't pass this session, we should realize that it will probably be September, 1951, before actual flight training can start. We'd like to see all the aviation organizations get behind it and push it."

So would the Air Force, which is growing older every day. The Air Surgeon states that the top age for jet pilots is 30 years, and for conventional aircraft about 32 years. The average age of the men in the Reserve now is about 28 years and in another two to three years they will be too old. This bill would provide replacements.

Weather Insurance

"The best insurance we've got that our students aren't going to fly into doubtful weather and kill themselves is the few hours they get flying under the hood," according to **L. L. McElroy** of **McElroy Flying Service**, Ann Arbor, Mich. "We have a Stinson rigged up for instrument training and before any student gets his commercial license, we give him three or four hours under the hood. Not enough so he thinks he knows it all but enough to scare him good and show him what he *can't* get away with."

Other flight school operators might well think this over and consider whether such indoctrination should be required for a pilot's license. In 1949, 170 lightplane accidents resulted from trying to fly VFR into marginal or instrument weather. Of these 170 accidents, 81 resulted in fatalities—showing how high the penalty is. When you try it and get in trouble, you have about a 50-50 chance of getting through alive.

Service With a Truck

Bob Isenberg, airport manager at **Greater Cincinnati Airport**, Covington, Ky., believes that his field is the first to have a fixed base operator using an air conditioning truck.

The operator, **Boone County Airlines, Inc.**, recently purchased the truck from American Airlines and is using it for heating executive aircraft in the winter and keeping them cool in the summer.

Isenberg says, "I think this is newsworthy in view of the fact that many base operators are going backwards instead of forward."

Agreed.

Running Up the Bill

Down near **Wrightsville, Ga.**, a Cessna recently gave a violent hiccup and indications that it was through flying for the day. Five cotton plants went to heaven but within the next two minutes the plane and the pilot, **Geri Massinter** of San Francisco, had settled down safely in a cotton field.

The magneto drive shaft had broken and metal slivers from the drive shaft gears were being chewed into the engine. "Whatever you do," said the mechanic who came over from **Dublin Airfield**, Dublin, Ga., "Don't run the engine up. It will ruin it." So arrangements were made for him to truck the plane to Dublin Airfield.

Next morning, the same mechanic, presumably removing the wings from the plane for trucking, ran the engine up four times "To try to take the plane off and fly it over."

Result: one engine, which might have been repaired and flushed out, now has to be torn down. Question: who ought to pay this bill and what does this sort of maintenance work do to personal flying?

Tucson Stretch

Those rubber dollars handed out by **Bob Schmidt**, manager of **Tucson Municipal Airport**, Tucson, Ariz., are stretching all the way across the United States. One side of the elastic dollar reads, "Good Luck" from "The Delighted State of Hysteria." And the other side advises, "Why Wander and Wonder?" Fly the T-Line from Tallahassee, Terre Haute, Tennessee, Ticonderoga, Texas, Toledo, Topeka, Tuscaloosa and Tulsa to TUCSON MUNICIPAL AIRPORT."

We'll try to stretch it back to Tucson, Bob.

—BARBARA WARD

Omnirange

(*Continued from Page 57*)

strument then tells him whether the course he has selected is that to the station; if not, he turns the selector knob through 180 degrees until the course needle again centers, turns the aircraft to the heading selected and flies the course needle to the station. As he passes over the station, the To-From indicator will move down to read "from."

An Omni-bearing Indicator has been developed by Collins for aircraft where lack of a gyro or fluxgate compass precludes installation of the ILS cross-bar indicator. The pilot simply tunes in the radio and the instrument gives him a continuous picture of the heading to the omnirange station.

Another Collins instrument, the Radio Magnetic Indicator, looks much like the present-day ADF or radio compass. When the station is tuned in, a needle on the dial points to the omnirange station; a second needle can be converted to point to either another omnirange station or to a low frequency station, giving the pilot two simultaneous bearings. A pointer at the top of the dial shows the heading of the aircraft.

Cost of Collins omnirange equipment depends on the combination of instruments desired but is estimated from $1200 up.

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WINGS OF YESTERDAY

25 Years Ago

Postmaster General New advertised for bids for eight new air mail routes on July 15, 1925, as authorized in the Kelly Bill approved by Congress on February 2, 1925.

●

Paul W. Litchfield, v.p. and factory manager of the Goodyear Tire & Rubber Co., and v.p. and general manager of the Goodyear-Zeppelin Corp., on July 15, 1925 completed 25 years of service with the Goodyear organization.

●

The Globe Aircraft Co. was established in Kansas City, Mo., and was planning to purchase planes for passenger transportation.

10 Years Ago

(In AMERICAN AVIATION)

Confusion and friction marked the formal transfer of the Civil Aeronautics Authority into the Department of Commerce June 30, 1940. Two key agency men had resigned, and other important resignations were expected, as a result of the reorganization.

●

Thomas O. Hardin, whose office as chairman of the Air Safety Board was abolished by the reorganization, was elected vice president in charge of safety for Transcontinental & Western Air, Inc.

●

A new law authorizing the government to award aircraft procurement contracts by negotiation, and cutting profits allowed on aircraft and parts from 12% to 8% was passed by Congress.

LETTERS

On Lightplane Service

To the Editor:

I just want to say how much I enjoyed Barbara Ward's column in the July 1 issue of *American Aviation*. It is priceless! The trouble is I am afraid that it will not be read by those who have it in their power to do something about the situation. But none the less we need more writing like this.

JOHN H. FREDERICK
Professor of Transportation
University of Maryland

(Editor's Note: The article referred to by Dr. Frederick highlighted the lack of good lightplane servicing encountered by Miss Ward on her recent transcontinental air tour by Ercoupe.)

TECHNICAL LITERATURE

Mountings: The Barry Corp., 179 Sidney St., Cambridge, Mass., has published Catalog No. 502, an eight-page illustrated brochure describing unit-type air-damped Barry-Mounts and mounting bases for electronic equipment and other sensitive apparatus. Includes principles of operation, engineering data, etc.

Tape Booklet: Polyken Industrial Tape, 222 W. Adams St., Chicago, Ill. is distributing a free pocket booklet titled "Tape is a Tool." Lists "dozens" of individual tapes, their specifications and uses.

Electrical Instruments: General Electric Co., Schenectady 5, N. Y., has published a newly revised edition of the "Manual of Electric Instruments." Describes fundamentals of operation and construction of all major types of electric instruments. 150 pages illustrated. Price $1.00.

Manometers: King Engineering Corp., Ann Arbor, Michigan, has released bulletin M-101 describing their line of King Manometers including specifications and prices. The four-page brochure is illustrated and describes manometers in 14 lengths with scales from 12 inches to 116 inches long for use on line pressures up to 200 psi.

Lift Truck: Hyster Co., 2902 N. E. Clackamas St., Portland, Ore., is circulating an eight-page catalog, No. 1135, describing the new Hyster 2,000-pound capacity lift truck. Includes complete specifications.

Technical Reports: CAA's D Technical Development Division, Indianapolis, Ind., has published the following three reports:

"Polarization Errors of Two Different Omnirange Antenna Arrays," by S. R. Anderson and J. F. Keary, a 10-page report on flight tests of omni-range equipment at Youngstown, O., and Indianapolis, Ind.

"Collision of Birds with Aircraft in Scheduled Commercial Operations in the Continental United States," by George L. Pigman and Pell Kangas. A 20-page report covering an analysis of 473 records of collisions of birds with aircraft in scheduled operations over a four-year period.

"Investigation of Windshield Materials and Methods of Windshield Mounting," by Pell Kangas and George L. Pigman. Technical Development Report number 74 is an outline and summary of extensive testing by CAA related to the effect of high speed impacts between aircraft windshields and birds. Tests were conducted using freshly killed birds which were projected against the windshields at speeds up to 450 mph using a compressed air catapult.

OBITUARY

C. L. Lawrance

C. L. Lawrance, 67, inventor of the Wright Whirlwind air-cooled engine, died at his home at East Islip, L. I., N. Y., June 23. Lawrance was president of Wright Aeronautical Corp. from 1924 to 1929, and in 1929-30 was vice president of Curtiss-Wright Corp. From 1931 to 1932 he served as president of the Aeronautical Chamber of Commerce. In 1930, he founded Lawrance Engineering and Research Corp. in Linden, N. J. He retired as president of this firm in 1944 and became board chairman until he withdrew from all business activities two years ago because of failing health.

En Route

(Continued from Page 62)

family dog had taken a liking to the thousand-year-old mummy and had eaten everything except the jawbone, even including the textile wrappings.

Moral: ashes to ashes, dust to dust, and then to dogfood. Or, mummy, keep that hungry dog away.

✣ ✣ ✣

Waddle In. You've seen a penguin walking, surely, just sort of waddling along with tail swinging from one side to the other. A lot of airplane taxying is the same way. So down in Chile the control tower operators advise pilots over the mike to "pinguinaire" to the ramp or to "pinguinaire" to the runway for take-off.

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IN FLIGHT

A PAGE FOR ALL PILOTS

Northrop YRB-49A Cockpit Impressions

Prior to first flight of the six-jet Northrop YRB-49A experimental reconnaissance bomber, we had an opportunity to make a brief cockpit assessment. There is accommodation for two pilots in tandem, and the rear cockpit has full dual control. Both cockpits have plain sticks (not wheels or broken sticks). The forward view is very good indeed and with the steerable nosewheel control—which is a large wooden wheel on the left of the front pilot—it must be an easy aircraft to maneuver on the ground. The view above is unrestricted but the azimuth view is disappointing—backwards it is hardly possible to see much, and sideways the sill line of the cockpit is so high that one can just peer above the top wing to get an extremely foreshortened view of the top wing surface.

Entrance to the aircraft is by a ladder through a small manhole, and inside there is plenty of space for all people to stand and move about in comfort. It is all rather dark as light comes from the cockpit canopy. To sit in the pilots' seats you step up from the main floor and here the control trimmers and instruments lie around almost in profusion. The speed restriction shows 460 mph at low altitudes merging into mach .7 at altitude, neither of which have been reached, according to latest reports. The Wings have been to 40,000 feet and full performance trials with the eight jet aircraft have been completed.

Whatever the merits or otherwise of the tail-less aircraft, particularly the stability and rate of yaw without the use of endplates, the Northrop multi-jet series of Wings are the most significant and satisfying piece of aerodynamics of their kind since the Horten IV.

—R. G. W.

Don't Buy an Orphan

Pilots who are considering buying a used plane should get a copy of the new sheet on "How to Buy a Used Plane" by the **Aircraft Owners and Pilots Association.** It tells you in seven short sentences how to go about buying a plane and how **not** to get caught with a lemon which has a lot of CAA paper work missing.

Among other things, it warns, "Beware of airplanes that are orphans." Trying to get parts for a good buy that went out of production in 1935 can turn a bargain into a liability.

The things you should check in engine, fabric, propeller, etc. are outlined and on the reverse side of the sheet is a simple contract which AOPA says will hold water in any court, to protect the seller and you.

Speak Up!

If you think you have to learn a special jargon to talk on the radio, you're wrong. **D. W. Rentzel,** CAA Administrator, says, "We don't care how you say it. Just talk to us, please."

It isn't that the CAA communications men are lonely—they just have suddenly realized that a lot of private pilots have mike fright and would rather fly on and look at the weather than touch that mike and ask for it. Part of the reason is fear that they'll squeek, and most of it is fear that they'll say the wrong thing.

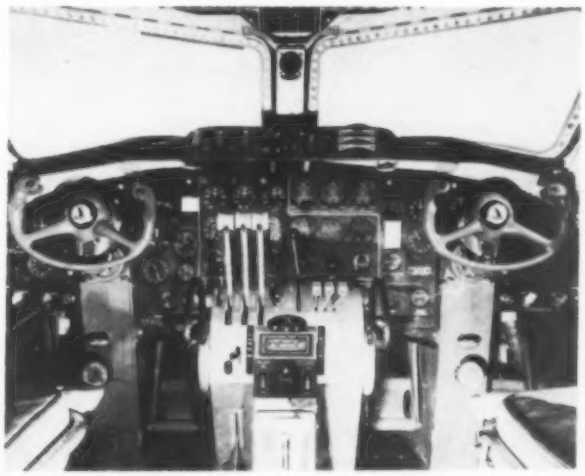
Rentzel says stop worrying, just press the mike button and talk to the communicator and traffic controllers any time, in any kind of English. Say, "Hey, look, this is Joe Doakes, and I'm going to Louisville. How's the weather over there? Stinking?" in Brooklynese, Birmingham drawl or a Texas twang. You'll be just as welcome as the hot-shot pilot who knows how to say "Roger!" CAA would like you to use short and standard procedures when you can but radio promotes safety so, above all, use it.

Stall Warning Stick Wobbler

One of the curious things about aviation is the way the same solution to a problem appears to hit technicians simultaneously in many parts of the world. The latest idea to do this is the principle of using a mechanical linkage to impart simulated for and aft instability when speed is reduced to a predetermined point close to the stall. This is a fundamentally sound principle, but if pilots were given the choice they would probably prefer that manufacturers use a root-stall vane inducer. This achieves the same end and obviously cuts out the possibility of failure of the linkage.

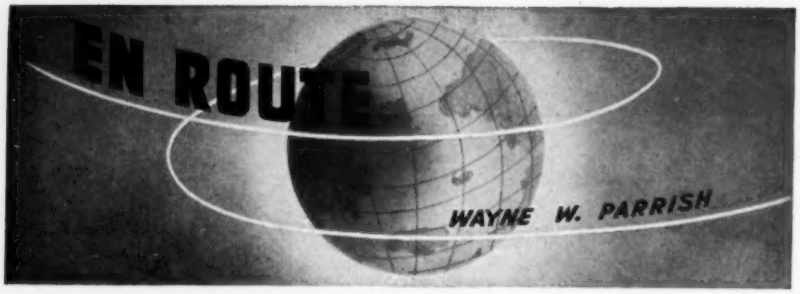
Barometrically Operated Parachute

The more you think about use of the barometrically operated ripcord for opening the parachute, the more sensible and satisfactory it seems. The shock of seat ejection at high speeds is still an unknown element—some people claim no ill effects, others say they were winded by the blast at high forward speeds above 450 mph. The drogue opening also has proved a violent operation, and a pilot who may have lost blood in the cockpit from a wound during combat before ejection might be completely overcome by either of these operations and so be unable to perform the last simple action to ensure his survival. Seat ejection might be described as an extremely uncompromising solution to a stern problem, and anything which makes the process easier for the pilot will be popular.



Nothing Wrong Here—Designed by Northrop pilots for USAF operators, the Northrop C-125 controls shows a clean, safe, fatigue-free workshop. Ten of the 23 aircraft on order will be for Arctic rescue work and these aircraft will have a pilot-operated switch on the pedestal which couples the ILS to the gyro-pilot, thus providing an automatic blind approach system.

BOEING . CONSOLIDATED VULTEE . DOUGLAS



Notes along the way of the Braniff inaugural flight to Buenos Aires.

All in a Day. Hopping off on a long trip (this one about 18,000 miles) never ceases to be a thrill . . . Last minute packing . . . Then to the office in the morning to wind up some work . . . taking off in a National Airlines DC-6 about noon for Havana . . . **Capt. Jack Isbill** sends back a drink with his compliments because we're behind schedule and I might miss a drink at the cocktail party at the Hotel Nacional in Havana . . . The usual noisy confusion at Rancho Boyeros Airport . . . The rush through Havana traffic to the cocktail party where I join up with the Braniff group just arrived from Houston . . . seeing a lot of old friends like **Doug Wood**, Braniff's manager for Cuba, and and meeting some new ones . . . and in a few hours we fly on to Panama to spend the night.

From office in Washington to cocktail party in Havana to bed in the Canal Zone—that's a day to the king's taste, but the old-time kings never lived so well nor traveled so far so fast.

✚ ✚ ✚

Heat and Customs. Panama isn't my idea of a paradise even in winter. It's hot, humid, sticky and enervating all the time.

All airlines are now using Tocumen Airport in the Republic of Panama about 20 miles east of the twin cities of Panama City and Balboa, C. Z., on the Pacific side. Pilots much prefer Tocumen to the U. S. Albrook Field in the Canal Zone because Albrook has some tricky terrain obstacles. They can get into Tocumen anytime. Passengers object to Tocumen, however, because Albrook was almost "across the street" from town.

Some day Tocumen will have a big terminal building, but some new money has to be found. Seems that the Republic set aside enough money to build a complete airport, but somehow some of the money disappeared. The money ran out when the runways were completed so a temporary wooden terminal was erected. But it's plenty adequate for the time being.

Now here's a bit of irony. Albrook Field, which all airlines previously used, is in the U. S. Canal Zone. U. S. Customs used to go through passenger baggage with fine tooth combs. There is no fence or barrier of any kind between the Canal Zone and the Republic of Panama. Now the passengers arrive in the Republic of Panama and its customs officials rarely look at anything. Yet there isn't the slightest formality for anyone to go direct into the Canal Zone from the airport. It's a strange world. Two years ago the customs procedure was rigid, because it was U. S. customs. Now it is trivial. Yet when you leave either airport, you're free to go anywhere you like.

✚ ✚ ✚

Heat and Arrogance. Here's some good news for all those who stop off in Panama. The new deluxe 360-room air-conditioned Panama Hotel being built by the Intercontinental Hotels Corp., which PAA far-sightedly sparked into existence, is nearing completion and ought to be open next winter. It should be one of the world's finest hotels.

What a relief it will be, too. Ever since 1906 when it was built, the Tivoli Hotel in Balboa, C. Z., has been the traditional stopping-off place. It's a rambling wooden structure, suitable as an antique or museum piece, and noteworthy (from my experience, anyway) for its poor service. Never have I encountered such arrogance and indifference in a dining room as at the Tivoli. The colored gang came from Trinidad and ought to be sent back there.

Plumbing fixtures are antiquated and you're lucky if you rate a complete set. Not a single room has ever been air-conditioned although one can do without this modern comfort. The hotel is owned and operated by the Panama Railroad, U. S. Government. I understand it's to be torn down when the Panama Hotel is opened and this will be a fitting end for it.

✚ ✚ ✚

Heat and $$. Ever since the U. S. began withdrawing military personnel a year or two ago, Panama has been screaming for business. Those GI dollars are missed. The long row of cutthroats bars and "night-clubs" isn't as active as it used to be. A reliable scout reported to me that even the famous House of Love east of town has had to close for lack of business, although extraordinary things are still being done with a cigaret in the west end of town on request. (**J. D. Bowersock** of the *Kansas City Star*, please note.) Buyers still have to bicker like fury with the local merchants if they want a bargain in perfume but, if you know your way around, Panama is a good shopping place.

And all hail to the U. S. commissary in the Canal Zone. Walking down the street in Panama, hot and sweaty, I ran into **Capt. Butch Poole**, now flying for Braniff, whom I hadn't seen since I flew with him in NATS in the Pacific during the war. We hoisted ourselves up on a soda fountain stool and had a delicious chocolate malted milkshake. I rarely have milkshakes in U. S. A. but they sure taste good when you get them in scarce areas.

✚ ✚ ✚

Goodbye Mummy. **Jimmie Walker**, Panagra's operations manager, and his wife Liz, have been well publicized, because of the rare animals and birds they've harbored in their home in Lima, Peru. Several years ago they had two vicunas, the delicate deer-like animal that lives high in the Andes; a baby tiger, a cat, dog and tropical birds. But one vicuna and the tiger died, the other vicuna got too playful and is now loaned out, and there have been a few changes in the bird menagerie. The latest is a friendly long-billed toucan bird from the Brazilian jungle.

But the prize animal story of all time, I think, was told to me by Jimmie on my latest trip to Lima. On the outskirts of Lima are ancient burial grounds and, while the government officially prohibits digging in these grounds, it is nonetheless a popular pastime for local residents to root around to dig up ancient pottery, textiles and bones. One day a friend of Jimmie's found a well-preserved mummy under the sand and estimated its

age at 900 A. D., since it was in the burial ground of Indians of that period of time.

The friend was leaving for the U. S. so he delivered the mummy to Jimmie at his home as a gift. Jimmie and his wife named it Carlita and kept it in the house for awhile, but there just wasn't a suitable permanent home for it so Carlita ended up in the garage where it was promptly forgotten about. One day Jimmie discovered that the

(*Continued on Page* 60)

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